FCC PART 22H, PART 24E

FCC PART 27

MEASUREMENT AND TEST REPORT

For

CLC HONG KONG LIMITED

1011A, 10/F., Harbour Centre Tower 1, No.1 Hok Cheung St., Hung Hom, Kowloon, Hong Kong

FCC ID: 2AG4WZ517

Report Type:	Product Type:
Original Report	Compass LTE

Report Number:	RDG171228009-00D
Report Date:	2018-02-10
Reviewed By:	Jerry Zhang EMC Manager
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

EUT Name:		Compass LTE
EUT Model:		Z517
FCC ID:		2AG4WZ517
Rated Input Voltage:		DC3.8V from Battery or DC 5V from adapter
Adapter Information	**Model:**	PMC43
	Input:	AC100-240V~ 50/60Hz 0.2A
	Output:	5.0V , 1.0A
External Dimension:		Length (14.5 cm)*Width (7.1 cm)*High (0.9 cm)
Serial Number:		171228009
EUT Received Date:		2017.12.28

Objective

This report is prepared on behalf of **CLC HONG KONG LIMITED** in accordance with: Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communications Commission's rules.
Part 2, Part 27 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Rules for output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, spurious radiated emission, frequency stability and band edge.

Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2AG4WZ517.
FCC Part 15C DSS submissions with FCC ID: 2AG4WZ517.
FCC Part 15B JBP submissions with FCC ID: 2AG4WZ517.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 22 Subpart H - Public Mobile Services
Part 24 Subpart E - Personal Communication Services
Part 27 – Miscellaneous wireless communications services

Applicable Standards: TIA/EIA 603-D-2010.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp.(Dongguan).

Measurement Uncertainty

Parameter	Measurement Uncertainty
Occupied Channel Bandwidth	±5 %
RF output power, conducted	±0.61dB
Unwanted Emissions, radiated	30MHz ~ 1GHz:5.85 dB 1G~26.5GHz: 5.23 dB
Unwanted Emissions, conducted	±1.5 dB
Temperature	±1℃
Humidity	±5%
DC and low frequency voltages	±0.4%
Duty Cycle	1%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218,the FCC Designation No. : CN1220.

The test site has been registered with ISED Canada under ISED Canada Registration Number 3062D.

SYSTEM TEST CONFIGURATION

Justification

The EUT was configured for testing according to TIA/EIA-603-D 2010.

The test items were performed with the EUT operating at testing mode. The device support GSM/GPRS/ EDGE 850 band and 1900 band, WCDMA/HSUPA/HPDPA/DC-HSDPA/HSPA+ Band 2 and Band 5, LTE band 2,4,5,7 and 17.
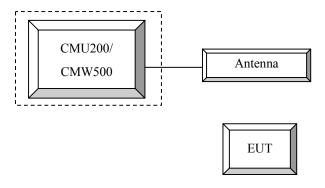
Equipment Modifications

No modification was made to the EUT.
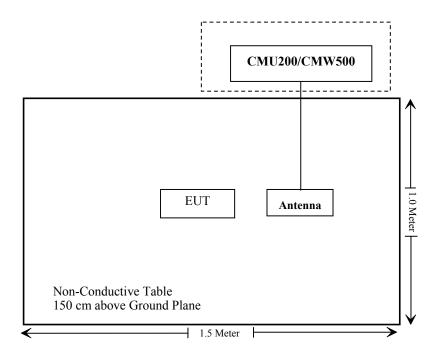
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
R&S	Universial Radio Communication Tester	CMU200	109038
R&S	Wideband Radio Communication Tester	CMW500	147473
N/A	ANTENNA	N/A	N/A

Configuration of Test Setup

Block Diagram of Test Setup

SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1310, §2.1093	RF Exposure	Compliance
§2.1046; § 22.913 (a); § 24.232 (c); §27.50	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905 § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliance
§ 2.1051, § 22.917 (a); § 24.238 (a); §27.53	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053 § 22.917 (a); § 24.238 (a); §27.53	Field Strength of Spurious Radiation	Compliance
§ 22.917 (a); § 24.238 (a); §27.53	Out of band emission, Band Edge	Compliance
§ 2.1055 § 22.355; § 24.235; §27.54	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

FCC §1.1310 & §2.1093- RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliant, please refer to the SAR report: RDG171228009-20.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H & 24E, Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

FCC § 2.1046, § 22.913 (a) & § 24.232 (c) & § 27.50 - RF OUTPUT POWER

Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §24.232 (d) Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

According to §27.50

(b)(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

(c) (10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

(d), (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(h),(2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

Test Procedure

GSM/GPRS/EGPRS

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection   Press Signal Off to turn off the signal and change settings
Network Support > GSM + GPRS or GSM + EGSM
Main Service > Packet Data
Service selection > Test Mode A – Auto Slot Config. off
MS Signal   Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting
        > Slot configuration   > Uplink/Gamma
        > 33 dBm for GPRS 850
        > 30 dBm for GPRS 1900
        > 27 dBm for EGPRS 850
        > 26 dBm for EGPRS 1900
BS Signal   Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset >   + 0 Hz
Mode >   BCCH and TCH
BCCH Level >   -85 dBm (May need to adjust if link is not stable)
BCCH Channel >   choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type >   Off
P0 >   4 dB
Slot Config >   Unchanged (if already set under MS signal)
TCH >   choose desired test channel
Hopping >   Off
Main Timeslot >   3
Network   Coding Scheme >   CS4 (GPRS) and MCS5 (EGPRS)

 Bit Stream >   2E9-1 PSR Bit Stream
AF/RF   Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection   Press Signal on to turn on the signal and change settings

WCDMA-Release 99

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification. The EUT has a nominal maximum output power of 24dBm (+1.7/-3.7).

WCDMA General Settings	Loopback Mode	Test Mode 1
	Rel99 RMC	12.2kbps RMC
	Power Control Algorithm	Algorithm2
	βc / βd	8/15

WCDMA HSDPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	HSDPA	HSDPA	HSDPA	HSDPA
	Subset	1	2	3	4
WCDMA General Settings	Loopback Mode	Test Mode 1			
	Rel99 RMC	12.2kbps RMC			
	HSDPA FRC	H-Set1			
	Power Control Algorithm	Algorithm2			
	βc	2/15	12/15	15/15	15/15
	βd	15/15	15/15	8/15	4/15
	βd (SF)	64			
	βc/ βd	2/15	12/15	15/8	15/4
	βhs	4/15	24/15	30/15	30/15
	MPR(dB)	0	0	0.5	0.5
HSDPA Specific Settings	DACK	8			
	DNAK	8			
	DCQI	8			
	Ack-Nack repetition factor	3			
	CQI Feedback	4ms			
	CQI Repetition Factor	2			
	Ahs=βhs/ βc	30/15			

WCDMA HSUPA

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

	Mode	**HSUPA**	**HSUPA**	**HSUPA**	**HSUPA**	**HSUPA**
	Subset	**1**	**2**	**3**	**4**	**5**
WCDMA General Settings	Loopback Mode	Test Mode 1				
	Rel99 RMC	12.2kbps RMC				
	HSDPA FRC	H-Set1				
	HSUPA Test	HSUPA Loopback				
	Power Control Algorithm	Algorithm2				
	βc	11/15	6/15	15/15	2/15	15/15
	βd	15/15	15/15	9/15	15/15	0
	βec	209/225	12/15	30/15	2/15	5/15
	βc/ βd	11/15	6/15	15/9	2/15	-
	βhs	22/15	12/15	30/15	4/15	5/15
	CM(dB)	1.0	3.0	2.0	3.0	1.0
	MPR(dB)	0	2	1	2	0
HSDPA Specific Settings	DACK	8				
	DNAK	8				
	DCQI	8				
	Ack-Nack repetition factor	3				
	CQI Feedback	4ms				
	CQI Repetition Factor	2				
	Ahs=βhs/ βc	30/15				
HSUPA Specific Settings	DE-DPCCH	6	8	8	5	7
	DHARQ	0	0	0	0	0
	AG Index	20	12	15	17	21
	ETFCI	75	67	92	71	81
	Associated Max UL Data Rate kbps	242.1	174.9	482.8	205.8	308.9
	Reference E_FCls		E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27		E-TFCI 11 E-TFCI PO4 E-TFCI 92 E-TFCI PO 18	E-TFCI 11 E E-TFCI PO 4 E-TFCI 67 E-TFCI PO 18 E-TFCI 71 E-TFCI PO23 E-TFCI 75 E-TFCI PO26 E-TFCI 81 E-TFCI PO 27	

HSPA+

The following tests were conducted according to the test requirements in Table C.11.1.4 of 3GPP TS 34.121-1

Sub-test	β_c (Note3)	β_d	β_{HS} (Note1)	β_{ec}	β_{ed} (2xSF2) (Note 4)	β_{ed} (2xSF4) (Note 4)	CM (dB) (Note 2)	MPR (dB) (Note 2)	AG Index (Note 4)	E-TFCI (Note 5)	E-TFCI (boost)
1	1	0	30/15	30/15	β_{ed}1: 30/15 β_{ed}2: 30/15	β_{ed}3: 24/15 β_{ed}4: 24/15	3.5	2.5	14	105	105

Note 1:　Δ_{ACK}, Δ_{NACK} and Δ_{CQI} = 30/15 with β_{hs} = 30/15 * β_c.

Note 2:　CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).

Note 3:　DPDCH is not configured, therefore the β_c is set to 1 and β_d = 0 by default.

Note 4:　β_{ed} can not be set directly; it is set by Absolute Grant Value.

Note 5:　All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

DC-HSDPA

The following tests were conducted according to the test requirements in Table C.8.1.12 of 3GPP TS 34.121-1

Table C.8.1.12: Fixed Reference Channel H-Set 12

Parameter	Unit	Value
Nominal Avg. Inf. Bit Rate	kbps	60
Inter-TTI Distance	TTI's	1
Number of HARQ Processes	Processes	6
Information Bit Payload (N_{INF})	Bits	120
Number Code Blocks	Blocks	1
Binary Channel Bits Per TTI	Bits	960
Total Available SML's in UE	SML's	19200
Number of SML's per HARQ Proc.	SML's	3200
Coding Rate		0.15
Number of Physical Channel Codes	Codes	1
Modulation		QPSK
Note 1:　The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.		
Note 2:　Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.		

LTE (FDD):

The following tests were conducted according to the test requirements in 3GPP TS36.101

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3

Modulation	Channel bandwidth / Transmission bandwidth (RB)						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (sub-clause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	NA
NS_03	6.6.2.2.1	2, 4, 10, 23, 25, 35, 36	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2	41	5	>6	≤ 1
			10, 15, 20	See Table 6.2.4-4	
NS_05	6.6.3.3.1	1	10,15,20	≥ 50	≤ 1
NS_06	6.6.2.2.3	12, 13, 14, 17	1.4, 3, 5, 10	Table 5.6-1	n/a
NS_07	6.6.2.2.3 / 6.6.3.3.2	13	10	Table 6.2.4-2	Table 6.2.4-2
NS_08	6.6.3.3.3	19	10, 15	> 44	≤ 3
NS_09	6.6.3.3.4	21	10, 15	> 40	≤ 1
				> 55	≤ 2
NS_10		20	15, 20	Table 6.2.4-3	Table 6.2.4-3
NS_11	6.6.2.2.1	23¹	1.4, 3, 5, 10	Table 6.2.4-5	Table 6.2.4-5
NS_32	-	-	-	-	-

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

Radiated method:

ANSI/TIA-603-D section 2.2.17

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100224	2017-12-11	2018-12-11
Sunol Sciences	Antenna	JB3	A060611-1	2017-11-10	2020-11-10
R&S	Spectrum Analyzer	FSU 26	200256	2017-01-04	2018-01-04
ETS-Lindgren	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
HP	Signal Generator	1026	320408	2017-12-08	2018-12-08
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each Time	/
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	21.9°C
Relative Humidity:	38 %
ATM Pressure:	100.9 kPa

* The testing was performed by Blake Yang & Eric Xiao on 2018-01-02

Conducted Output Power

Cellular Band & PCS Band

Band	Channel No.	Conducted Peak Output Power (dBm)								
		GSM	GPRS 1 TX Slot	GPRS 2 TX Slot	GPRS 3 TX Slot	GPRS 4 TX Slot	EDGE 1 TX Slot	EDGE 2 TX Slot	EDGE 3 TX Slot	EDGE 4 TX Slot
Cellular	128	32.00	32.04	31.20	29.47	28.35	26.38	25.51	23.67	22.81
	190	31.80	31.85	31.02	29.22	28.11	26.05	25.16	23.30	22.45
	251	31.70	31.73	30.90	29.09	28.01	25.61	24.76	22.98	22.01
PCS	512	29.30	29.54	28.66	26.97	25.97	25.47	24.19	22.07	20.80
	661	29.10	29.39	28.57	26.82	25.84	26.05	24.83	22.63	21.36
	810	28.80	28.99	28.22	26.42	25.45	26.25	25.07	22.75	21.49

WCDMA Band Ⅱ

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	22.56	2.76	22.58	2.96	22.53	2.72
HSDPA	1	21.47	3.72	21.46	3.84	21.37	3.20
	2	21.27	3.53	21.28	3.77	21.32	3.29
	3	21.57	3.77	21.40	3.65	21.33	3.16
	4	21.55	3.74	21.28	3.65	21.35	3.15
HSUPA	1	21.38	3.36	21.43	4.20	21.37	4.16
	2	21.45	3.21	21.34	4.16	21.19	4.23
	3	21.44	3.37	21.29	4.09	21.34	4.06
	4	21.48	3.27	21.26	4.23	21.44	4.11
	5	21.18	3.20	21.53	4.12	21.44	4.00
DC-HSDPA	1	21.44	3.72	21.56	3.73	21.37	3.15
	2	21.48	3.81	21.34	3.90	21.23	3.21
	3	21.54	3.72	21.54	3.74	21.23	3.20
	4	21.48	3.60	21.28	3.77	21.27	3.16
HSPA+	1	21.28	3.59	21.53	3.64	21.21	3.15

WCDMA Band V

Mode	3GPP Sub Test	Low Channel		Middle Channel		High Channel	
		Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)	Ave. Power (dBm)	PAR (dB)
Rel 99	1	22.68	2.44	22.58	2.60	22.51	2.28
HSDPA	1	21.61	3.24	21.54	4.00	21.51	3.40
	2	21.56	3.23	21.59	4.08	21.37	3.35
	3	21.56	3.16	21.42	3.87	21.49	3.30
	4	21.62	3.19	21.35	3.83	21.31	3.36
HSUPA	1	21.65	3.64	21.57	4.08	21.52	3.60
	2	21.52	3.47	21.57	3.95	21.61	3.60
	3	21.53	3.71	21.61	3.89	21.50	3.50
	4	21.74	3.65	21.47	4.08	21.39	3.41
	5	21.69	3.46	21.50	4.13	21.46	3.43
DC-HSDPA	1	21.63	3.2	21.37	3.92	21.52	3.44
	2	21.47	3.13	21.53	4.03	21.57	3.21
	3	21.71	3.26	21.41	3.88	21.49	3.30
	4	21.46	3.30	21.43	4.03	21.39	3.38
HSPA+	1	21.47	3.07	21.44	3.93	21.60	3.21

LTE Band 2 (PART 24)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	21.89	21.89	21.35
		1#3	21.91	21.93	21.15
		1#5	22.13	21.87	21.19
		3#0	22.03	21.99	21.13
		3#3	22.08	21.95	21.15
		6#0	21.19	21.01	20.25
	16QAM	1#0	21.13	21.07	20.34
		1#3	21.16	21.15	20.24
		1#5	21.24	21.03	20.49
		3#0	20.98	20.88	20.26
		3#3	21.09	20.84	20.27
		6#0	20.28	20.03	19.28
3MHz	QPSK	1#0	21.53	21.26	21.36
		1#8	21.53	21.22	21.02
		1#14	21.55	21.20	20.78
		6#0	20.56	20.27	20.07
		6#7	20.62	20.26	19.91
		15#0	20.61	20.31	19.99
	16QAM	1#0	20.75	20.16	20.40
		1#8	20.78	20.13	20.11
		1#14	20.78	20.09	19.88
		6#0	19.70	19.28	19.24
		6#7	19.79	19.25	19.14
		15#0	19.59	19.29	19.11
5MHz	QPSK	1#0	21.95	21.45	21.66
		1#13	21.51	20.97	20.80
		1#24	21.82	21.32	20.82
		15#0	20.75	20.01	20.16
		15#10	20.84	19.97	19.18
		25#0	21.03	20.03	20.02
	16QAM	1#0	21.04	20.56	20.68
		1#13	20.66	20.01	19.82
		1#24	21.03	20.43	19.86
		15#0	19.53	19.09	19.14
		15#10	19.56	19.02	18.83
		25#0	19.53	19.14	19.02

10MHz	QPSK	1#0	21.04	20.67	20.74
		1#24	21.26	20.84	20.98
		1#49	20.87	20.48	20.06
		25#0	20.39	19.84	20.17
		25#25	20.21	19.75	19.82
		50#0	20.34	19.81	20.07
	16QAM	1#0	20.28	19.61	19.98
		1#24	20.44	19.78	20.18
		1#49	20.06	19.45	19.27
		25#0	19.45	18.97	19.13
		25#25	19.27	18.90	18.80
		50#0	19.36	18.92	19.03
15MHz	QPSK	1#0	21.26	20.96	20.65
		1#38	21.16	20.76	20.80
		1#74	21.29	20.59	20.26
		36#0	20.53	19.81	19.88
		36#39	20.31	19.63	19.78
		75#0	20.55	19.75	19.85
	16QAM	1#0	20.53	19.89	19.99
		1#38	20.34	19.68	20.16
		1#74	20.24	19.54	19.59
		36#0	19.43	18.89	18.93
		36#39	19.25	18.78	18.80
		75#0	19.33	18.87	18.84
20MHz	QPSK	1#0	21.27	20.86	20.87
		1#49	21.12	20.58	20.32
		1#99	20.65	20.35	20.80
		50#0	20.28	19.72	19.78
		50#50	19.94	19.51	19.80
		100#0	20.12	19.62	19.85
	16QAM	1#0	20.45	20.08	19.83
		1#49	20.33	19.73	19.76
		1#99	19.87	19.53	19.32
		50#0	19.28	18.91	18.72
		50#50	18.97	18.70	18.74
		100#0	19.18	18.75	18.73

LTE Band 4 (PART 27)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	22.19	22.53	22.24
		1#3	22.77	22.42	22.30
		1#5	22.85	22.55	22.48
		3#0	22.63	22.63	22.38
		3#3	22.74	22.60	22.50
		6#0	21.75	21.81	21.59
	16QAM	1#0	21.60	22.22	21.52
		1#3	21.65	22.16	21.58
		1#5	21.76	22.13	21.79
		3#0	21.62	21.74	21.38
		3#3	21.65	21.78	21.52
		6#0	20.90	20.95	20.48
3MHz	QPSK	1#0	22.40	21.97	22.18
		1#8	22.42	21.69	22.19
		1#14	22.52	21.67	22.30
		6#0	21.67	21.14	21.44
		6#7	21.65	20.88	21.51
		15#0	21.79	21.06	21.52
	16QAM	1#0	22.23	21.44	21.63
		1#8	22.05	21.12	21.56
		1#14	21.97	20.94	21.61
		6#0	20.94	20.27	20.62
		6#7	20.96	20.17	20.66
		15#0	20.84	20.13	20.59
5MHz	QPSK	1#0	22.42	22.14	22.28
		1#13	22.03	21.40	21.93
		1#24	22.45	21.84	22.37
		15#0	21.08	20.66	20.99
		15#10	21.09	20.31	21.02
		25#0	21.12	20.28	21.03
	16QAM	1#0	21.70	21.26	21.74
		1#13	21.22	20.56	21.65
		1#24	21.63	20.89	21.25
		15#0	20.34	19.82	20.30
		15#10	20.31	19.62	20.28
		25#0	20.37	19.84	20.38

10MHz	QPSK	1#0	22.03	21.78	21.27
		1#24	22.25	21.50	21.64
		1#49	21.97	21.19	21.49
		25#0	21.50	20.87	20.67
		25#25	21.33	20.47	20.81
		50#0	21.60	20.73	20.84
	16QAM	1#0	21.23	20.73	20.55
		1#24	21.43	20.42	20.88
		1#49	21.10	20.08	20.63
		25#0	20.50	19.81	19.73
		25#25	20.35	19.56	19.85
		50#0	20.44	19.48	19.78
15MHz	QPSK	1#0	22.16	22.16	21.52
		1#38	22.15	21.23	21.64
		1#74	21.59	21.39	21.89
		36#0	21.53	20.79	20.62
		36#39	21.22	20.36	20.86
		75#0	21.39	20.51	20.73
	16QAM	1#0	21.57	21.15	20.85
		1#38	21.67	20.35	21.05
		1#74	21.13	20.45	21.40
		36#0	20.65	20.02	20.03
		36#39	20.26	19.52	20.15
		75#0	20.60	19.98	20.09
20MHz	QPSK	1#0	22.62	22.40	21.64
		1#49	22.67	21.43	21.67
		1#99	21.87	21.51	22.03
		50#0	21.69	21.07	20.67
		50#50	21.08	20.56	20.88
		100#0	21.65	20.82	20.73
	16QAM	1#0	21.95	21.62	20.87
		1#49	21.74	20.58	20.94
		1#99	20.94	20.60	21.13
		50#0	21.08	20.28	19.74
		50#50	20.44	19.82	19.89
		100#0	20.88	20.19	19.85

LTE Band 5 (PART 22)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4MHz	QPSK	1#0	22.32	22.35	22.32
		1#3	22.38	22.41	22.39
		1#5	22.37	22.33	22.32
		3#0	22.39	22.79	22.35
		3#3	22.37	22.39	22.38
		6#0	21.35	21.35	21.35
	16QAM	1#0	21.19	21.43	21.35
		1#3	21.33	21.54	21.45
		1#5	21.19	21.39	21.37
		3#0	21.19	21.27	21.21
		3#3	21.14	21.24	21.33
		6#0	20.38	20.39	20.20
3MHz	QPSK	1#0	22.30	22.35	22.33
		1#8	22.33	22.37	22.28
		1#14	22.29	22.31	22.23
		6#0	21.33	21.38	21.35
		6#9	21.34	21.40	21.33
		15#0	21.31	21.34	21.30
	16QAM	1#0	21.39	21.20	21.36
		1#8	21.41	21.27	21.37
		1#14	21.38	21.21	21.34
		6#0	20.40	20.31	20.38
		6#9	20.39	20.30	20.36
		15#0	20.28	20.28	20.29
5MHz	QPSK	1#0	22.41	22.41	22.40
		1#13	22.39	22.40	22.42
		1#24	22.37	22.36	22.36
		15#0	21.33	21.32	21.34
		15#0	21.34	21.31	21.32
		25#0	21.33	21.30	21.31
	16QAM	1#0	21.38	21.38	21.55
		1#13	21.35	21.38	21.54
		1#24	21.36	21.34	21.48
		15#0	20.30	20.33	20.35
		15#0	20.31	20.33	20.33
		25#0	20.38	20.35	20.28
10MHz	QPSK	1#0	22.37	22.32	22.33
		1#25	22.35	22.38	22.35
		1#49	22.40	22.36	22.38
		25#0	21.33	21.35	21.34
		25#25	21.39	21.33	21.39
		50#0	21.38	21.36	21.38
	16QAM	1#0	21.50	21.23	21.46
		1#25	21.53	21.27	21.47
		1#49	21.57	21.23	21.48
		25#0	20.40	20.36	20.33
		25#25	20.43	20.35	20.37
		50#0	20.41	20.34	20.35

LTE Band 7 (PART 27)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	1#0	22.22	22.13	21.93
		1#13	22.20	22.09	21.92
		1#24	22.17	22.01	21.88
		15#0	21.11	21.09	20.88
		15#10	21.06	21.01	20.89
		25#0	21.10	21.03	20.87
	16QAM	1#0	21.13	21.09	21.09
		1#13	21.16	21.04	21.08
		1#24	21.14	20.96	21.08
		15#0	20.08	19.93	19.84
		15#10	20.06	19.89	19.87
		25#0	20.10	20.01	19.80
10MHz	QPSK	1#0	22.09	21.78	21.86
		1#24	22.13	21.97	21.89
		1#49	22.12	22.05	21.92
		25#0	21.11	21.09	20.87
		25#25	21.12	21.05	20.93
		50#0	21.11	21.11	20.91
	16QAM	1#0	21.26	20.91	21.05
		1#24	21.23	21.00	21.08
		1#49	21.27	20.93	21.07
		25#0	20.11	20.11	19.84
		25#25	20.13	20.04	19.91
		50#0	20.12	20.08	19.89
15MHz	QPSK	1#0	22.09	21.82	21.89
		1#37	22.07	21.85	21.79
		1#74	21.81	22.07	21.98
		36#0	21.18	20.91	20.96
		36#39	21.16	21.13	20.99
		75#0	21.17	21.04	20.97
	16QAM	1#0	21.25	20.93	21.16
		1#37	21.21	20.96	21.06
		1#74	20.93	20.85	21.25
		36#0	20.10	20.06	20.03
		36#39	20.13	20.01	20.05
		75#0	20.10	20.07	19.97

20MHz	QPSK	1#0	22.24	21.38	22.02
		1#49	22.11	21.75	21.71
		1#99	20.88	21.96	22.09
		50#0	21.15	20.57	20.96
		50#50	20.49	21.03	20.92
		100#0	21.12	20.93	20.93
	16QAM	1#0	21.30	20.57	21.05
		1#49	21.32	20.98	20.79
		1#99	20.39	21.10	21.10
		50#0	20.16	20.13	19.97
		50#50	19.58	20.08	19.93
		100#0	20.13	20.09	19.95

LTE Band 17(PART 27)

Channel Bandwidth	Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5MHz	QPSK	1#0	22.96	22.97	22.92
		1#12	22.60	22.42	22.93
		1#24	22.71	22.62	22.91
		15#0	21.72	21.68	21.91
		15#10	21.51	21.48	21.89
		25#0	21.66	21.63	21.86
	16QAM	1#0	22.14	21.91	22.10
		1#12	21.86	21.48	22.11
		1#24	21.98	21.69	21.96
		15#0	20.86	20.63	20.96
		15#10	20.66	20.48	20.95
		25#0	20.68	20.65	20.88
10MHz	QPSK	1#0	22.82	22.87	22.82
		1#24	22.57	22.86	22.88
		1#49	22.51	22.72	22.79
		25#0	21.91	21.89	21.91
		25#25	21.88	21.92	21.92
		50#0	21.94	21.95	21.94
	16QAM	1#0	22.04	21.76	21.96
		1#24	21.84	21.87	22.09
		1#49	21.87	21.85	21.94
		25#0	20.91	20.94	20.93
		25#25	20.73	20.97	20.93
		50#0	20.93	20.98	20.95

PAR, Band 2

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.13	5.67	4.46	13
	100 RB		6.44	6.44	6.35	13
16QAM	1 RB	20 MHz	4.94	6.70	5.13	13
	100 RB		7.08	7.12	7.05	13

PAR, Band 4

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.55	4.74	4.94	13
	100 RB		6.44	6.25	6.38	13
16QAM	1 RB	20 MHz	5.58	5.58	6.03	13
	100 RB		7.21	7.02	7.18	13

PAR, Band 5

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	3.94	4.49	4.13	13
	50 RB		5.35	5.58	5.26	13
16QAM	1 RB	10 MHz	4.62	5.26	4.94	13
	50 RB		6.22	6.44	6.19	13

PAR, Band 7

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	20 MHz	4.78	4.17	4.81	13
	100 RB		6.28	6.51	6.47	13
16QAM	1 RB	20 MHz	5.87	5.45	5.74	13
	100 RB		7.15	7.12	7.15	13

PAR, Band 17

Test Modulation		Channel Bandwidth	Low Channel PAR (dB)	Middle Channel PAR (dB)	High Channel PAR (dB)	Limit (dB)
QPSK	1 RB	10 MHz	2.95	3.11	3.53	13
	50 RB		5.16	5.32	5.29	13
16QAM	1 RB	10 MHz	3.81	4.10	4.42	13
	50 RB		6.09	6.19	6.22	13

Note: peak-to-average ratio (PAR) <13 dB.

ERP & EIRP

Part 22H

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM 850 Middle Channel								
836.600	H	91.56	23.7	0.0	0.5	23.2	38.45	15.3
836.600	V	100.11	35.2	0.0	0.5	34.7	38.45	3.8
EDGE 850 Middle Channel								
836.600	H	85.83	17.9	0.0	0.5	17.4	38.45	21.1
836.600	V	94.28	29.4	0.0	0.5	28.9	38.45	9.6
WCDMA Band V Middle Channel								
836.600	H	82.77	14.9	0.0	0.5	14.4	38.45	24.1
836.600	V	90.20	25.3	0.0	0.5	24.8	38.45	13.7

Part 24E

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
PCS 1900 Middle Channel								
1880.000	H	91.25	18.3	11.1	1.6	27.8	33.00	5.2
1880.000	V	87.84	14.7	11.1	1.6	24.2	33.00	8.8
EDGE 1900 Middle Channel								
1880.000	H	89.64	16.7	11.1	1.6	26.2	33.00	6.8
1880.000	V	85.37	12.2	11.1	1.6	21.7	33.00	11.3
WCDMA Band II Middle Channel								
1880.000	H	86.32	13.4	11.1	1.6	22.9	33.00	10.1
1880.000	V	81.87	8.7	11.1	1.6	18.2	33.00	14.8

Note:
1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

LTE Band 2

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 1.4 MHz Middle Channel								
1880.000	H	85.02	12.1	11.1	1.6	21.6	33.00	11.4
1880.000	V	82.36	9.2	11.1	1.6	18.7	33.00	14.3
16QAM 1.4 MHz Middle Channel								
1880.000	H	85.15	12.2	11.1	1.6	21.7	33.00	11.3
1880.000	V	83.73	10.6	11.1	1.6	20.1	33.00	12.9
QPSK 3 MHz Middle Channel								
1880.000	H	84.67	11.7	11.1	1.6	21.2	33.00	11.8
1880.000	V	83.15	10	11.1	1.6	19.5	33.00	13.5
16QAM 3 MHz Middle Channel								
1880.000	H	85.18	12.2	11.1	1.6	21.7	33.00	11.3
1880.000	V	82.28	9.1	11.1	1.6	18.6	33.00	14.4
QPSK 5 MHz Middle Channel								
1880.000	H	83.98	11	11.1	1.6	20.5	33.00	12.5
1880.000	V	81.24	8.1	11.1	1.6	17.6	33.00	15.4
16QAM 5 MHz Middle Channel								
1880.000	H	85.09	12.1	11.1	1.6	21.6	33.00	11.4
1880.000	V	81.24	8.1	11.1	1.6	17.6	33.00	15.4
QPSK 10 MHz Middle Channel								
1880.000	H	84.50	11.5	11.1	1.6	21.0	33.00	12.0
1880.000	V	82.08	8.9	11.1	1.6	18.4	33.00	14.6
16QAM 10 MHz Middle Channel								
1880.000	H	84.51	11.6	11.1	1.6	21.1	33.00	11.9
1880.000	V	80.36	7.2	11.1	1.6	16.7	33.00	16.3
QPSK 15 MHz Middle Channel								
1880.000	H	85.16	12.2	11.1	1.6	21.7	33.00	11.3
1880.000	V	80.92	7.8	11.1	1.6	17.3	33.00	15.7
16QAM 15 MHz Middle Channel								
1880.000	H	85.03	12.1	11.1	1.6	21.6	33.00	11.4
1880.000	V	80.17	7	11.1	1.6	16.5	33.00	16.5
QPSK 20 MHz Middle Channel								
1880.000	H	83.97	11	11.1	1.6	20.5	33.00	12.5
1880.000	V	80.09	6.9	11.1	1.6	16.4	33.00	16.6
16QAM 20 MHz Middle Channel								
1880.000	H	84.32	11.4	11.1	1.6	20.9	33.00	12.1
1880.000	V	80.98	7.8	11.1	1.6	17.3	33.00	15.7

LTE Band 4

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 1.4 MHz Middle Channel								
1732.500	H	84.39	10.9	10.7	1.5	20.1	30.00	9.9
1732.500	V	83.18	9.4	10.7	1.5	18.6	30.00	11.4
16QAM 1.4 MHz Middle Channel								
1732.500	H	84.95	11.5	10.7	1.5	20.7	30.00	9.3
1732.500	V	83.52	9.7	10.7	1.5	18.9	30.00	11.1
QPSK 3 MHz Middle Channel								
1732.500	H	85.19	11.7	10.7	1.5	20.9	30.00	9.1
1732.500	V	83.15	9.4	10.7	1.5	18.6	30.00	11.4
16QAM 3 MHz Middle Channel								
1732.500	H	85.15	11.7	10.7	1.5	20.9	30.00	9.1
1732.500	V	83.09	9.3	10.7	1.5	18.5	30.00	11.5
QPSK 5 MHz Middle Channel								
1732.500	H	85.19	11.7	10.7	1.5	20.9	30.00	9.1
1732.500	V	82.15	8.4	10.7	1.5	17.6	30.00	12.4
16QAM 5 MHz Middle Channel								
1732.500	H	85.09	11.6	10.7	1.5	20.8	30.00	9.2
1732.500	V	82.18	8.4	10.7	1.5	17.6	30.00	12.4
QPSK 10 MHz Middle Channel								
1732.500	H	84.08	10.6	10.7	1.5	19.8	30.00	10.2
1732.500	V	81.58	7.8	10.7	1.5	17.0	30.00	13.0
16QAM 10 MHz Middle Channel								
1732.500	H	84.29	10.8	10.7	1.5	20.0	30.00	10.0
1732.500	V	81.57	7.8	10.7	1.5	17.0	30.00	13.0
QPSK 15 MHz Middle Channel								
1732.500	H	84.08	10.6	10.7	1.5	19.8	30.00	10.2
1732.500	V	80.39	6.6	10.7	1.5	15.8	30.00	14.2
16QAM 15 MHz Middle Channel								
1732.500	H	84.27	10.8	10.7	1.5	20.0	30.00	10.0
1732.500	V	80.39	6.6	10.7	1.5	15.8	30.00	14.2
QPSK 20 MHz Middle Channel								
1732.500	H	84.28	10.8	10.7	1.5	20.0	30.00	10.0
1732.500	V	80.15	6.4	10.7	1.5	15.6	30.00	14.4
16QAM 20 MHz Middle Channel								
1732.500	H	83.98	10.5	10.7	1.5	19.7	30.00	10.3
1732.500	V	80.51	6.7	10.7	1.5	15.9	30.00	14.1

LTE Band 5

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 1.4 MHz Middle Channel								
836.500	H	88.36	20.5	0.0	0.5	20.0	38.45	18.5
836.500	V	89.45	23.4	0.0	0.5	22.9	38.45	15.6
16QAM 1.4 MHz Middle Channel								
836.500	H	88.69	20.8	0.0	0.5	20.3	38.45	18.2
836.500	V	90.01	22.6	0.0	0.5	22.1	38.45	16.4
QPSK 3 MHz Middle Channel								
836.500	H	88.74	20.9	0.0	0.5	20.4	38.45	18.1
836.500	V	90.21	23.9	0.0	0.5	23.4	38.45	15.1
16QAM 3 MHz Middle Channel								
836.500	H	89.01	21.1	0.0	0.5	20.6	38.45	17.9
836.500	V	90.32	22.8	0.0	0.5	22.3	38.45	16.2
QPSK 5 MHz Middle Channel								
836.500	H	88.36	20.5	0.0	0.5	20.0	38.45	18.5
836.500	V	89.67	24.1	0.0	0.5	23.6	38.45	14.9
16QAM 5 MHz Middle Channel								
836.500	H	88.14	20.3	0.0	0.5	19.8	38.45	18.7
836.500	V	89.78	22.5	0.0	0.5	22.0	38.45	16.5
QPSK 10 MHz Middle Channel								
836.500	H	88.15	20.3	0.0	0.5	19.8	38.45	18.7
836.500	V	89.99	23.4	0.0	0.5	22.9	38.45	15.6
16QAM 10 MHz Middle Channel								
836.500	H	89.23	21.3	0.0	0.5	20.8	38.45	17.7
836.500	V	90.15	22.2	0.0	0.5	21.7	38.45	16.8

LTE Band 7

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5 MHz Middle Channel								
2535.000	H	85.37	14.3	12.2	1.8	24.7	33.00	8.3
2535.000	V	83.09	11.7	12.2	1.8	22.1	33.00	10.9
16QAM 5 MHz Middle Channel								
2535.000	H	84.28	13.2	12.2	1.8	23.6	33.00	9.4
2535.000	V	83.09	11.7	12.2	1.8	22.1	33.00	10.9
QPSK 10 MHz Middle Channel								
2535.000	H	85.09	14	12.2	1.8	24.4	33.00	8.6
2535.000	V	83.13	11.8	12.2	1.8	22.2	33.00	10.8
16QAM 10 MHz Middle Channel								
2535.000	H	84.12	13.1	12.2	1.8	23.5	33.00	9.5
2535.000	V	81.28	9.9	12.2	1.8	20.3	33.00	12.7
QPSK 15 MHz Middle Channel								
2535.000	H	84.59	13.5	12.2	1.8	23.9	33.00	9.1
2535.000	V	81.27	9.9	12.2	1.8	20.3	33.00	12.7
16QAM 15 MHz Middle Channel								
2535.000	H	83.99	12.9	12.2	1.8	23.3	33.00	9.7
2535.000	V	80.69	9.3	12.2	1.8	19.7	33.00	13.3
QPSK 20 MHz Middle Channel								
2535.000	H	84.07	13	12.2	1.8	23.4	33.00	9.6
2535.000	V	82.01	10.7	12.2	1.8	21.1	33.00	11.9
16QAM 20 MHz Middle Channel								
2535.000	H	83.15	12.1	12.2	1.8	22.5	33.00	10.5
2535.000	V	80.25	8.9	12.2	1.8	19.3	33.00	13.7

LTE Band 17

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK 5 MHz Middle Channel								
710.000	H	89.18	18.7	0.0	0.4	18.3	34.77	16.5
710.000	V	91.27	23.7	0.0	0.4	23.3	34.77	11.5
16QAM 5 MHz Middle Channel								
710.000	H	89.17	18.7	0.0	0.4	18.3	34.77	16.5
710.000	V	91.28	23.7	0.0	0.4	23.3	34.77	11.5
QPSK 10 MHz Middle Channel								
710.000	H	89.52	19	0.0	0.4	18.6	34.77	16.2
710.000	V	92.31	24.7	0.0	0.4	24.3	34.77	10.5
16QAM 10 MHz Middle Channel								
710.000	H	89.50	19	0.0	0.4	18.6	34.77	16.2
710.000	V	90.15	22.5	0.0	0.4	22.1	34.77	12.7

Note:
   1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
   2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
   3) Margin = Limit-Absolute Level

FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53- OCCUPIED BANDWIDTH
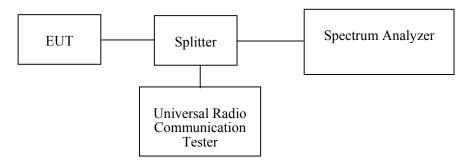
Applicable Standard

FCC §2.1049, §22.917, §22.905, §24.238 and §27.53.

Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The 26 dB & 99% bandwidth was recorded.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSU 26	200256	2017-01-04	2018-01-04
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	21.1~24.1°C
Relative Humidity:	39~42 %
ATM Pressure:	100.9~101 kPa

The testing was performed by Harry Yang on 2018-01-02 & 2018-01-30.
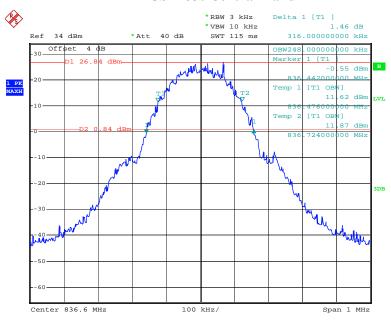
Test Mode: Transmitting

Test Result: Compliant. Please refer to the following table and plots.

Band	Test Channel	Mode	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
Cellular	M	GSM	0.248	0.316
		EDGE	0.254	0.314
PCS		PCS	0.248	0.314
		EDGE	0.250	0.314
WCDMA Band II		Rel 99	4.22	4.88
		HSDPA	4.24	4.88
		HSUPA	4.24	4.9
WCDMA Band V		Rel 99	4.24	4.88
		HSDPA	4.24	4.88
		HSUPA	4.22	4.88

Band	Test Modulation	Test Bandwidth (MHz)	Test Channel	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
LTE Band 2	QPSK	1.4	M	1.101	1.284
		3		2.702	2.942
		5		4.503	4.997
		10		8.974	9.869
		15		13.510	14.856
		20		17.949	19.311
	16QAM	1.4	M	1.106	1.300
		3		2.702	2.929
		5		4.487	4.952
		10		8.942	9.824
		15		13.510	14.744
		20		18.013	19.359
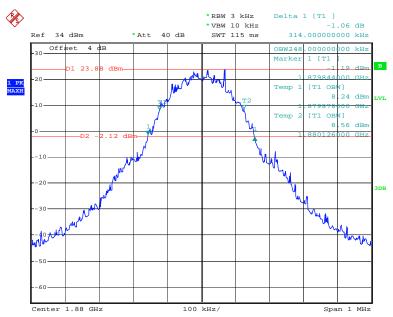
Band	Test Modulation	Test Bandwidth (MHz)	Test Channel	99% Occupied Bandwidth (MHz)	26 dB Occupied Bandwidth (MHz)
LTE Band 4	QPSK	1.4	M	1.101	1.287
		3		2.692	2.936
		5		4.503	4.984
		10		8.974	9.808
		15		13.462	14.760
		20		17.949	19.167
	16QAM	1.4	M	1.106	1.288
		3		2.692	2.937
		5		4.487	4.895
		10		8.942	9.783
		15		13.462	14.775
		20		17.885	19.246
LTE Band 5	QPSK	1.4	M	1.101	1.284
		3		2.692	2.933
		5		4.503	4.987
		10		9.006	9.795
	16QAM	1.4	M	1.101	1.285
		3		2.692	2.920
		5		4.487	4.936
		10		8.974	9.711
LTE Band 7	QPSK	5	M	4.503	4.990
		10		8.942	9.782
		15		13.462	14.718
		20		17.885	19.141
	16QAM	5	M	4.487	4.936
		10		8.942	9.663
		15		13.510	14.760
		20		17.885	19.135
LTE Band 17	QPSK	5	M	4.487	4.946
		10		8.974	9.836
	16QAM	5	M	4.503	4.946
		10		8.973	9.673

GSM 850 Cellular Band


```
                              *RBW  3 kHz      Delta 1 [T1 ]
                              *VBW 10 kHz                    1.46 dB
Ref  34 dBm        *Att  40 dB   SWT 115 ms     316.000000000 kHz
  Offset  4 dB                   OBW248.000000000 kHz
-30                              Marker 1 [T1 ]
D1 26.84 dBm                                    -0.55 dBm
-20                                             836.442000000 MHz
                                 Temp 1 [T1 OBW]
-10                                             11.62 dBm
                                                836.476000000 MHz
                                 Temp 2 [T1 OBW]
D2 0.84 dBm                                     11.87 dBm
 0                                              836.724000000 MHz
-10
-20
-30
-40
-50
-60
Center 836.6 MHz          100 kHz/              Span 1 MHz
```
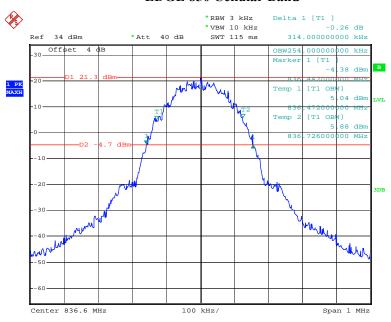
Date: 2.JAN.2018 21:47:25

GSM PCS1900 Cellular Band


```
                              *RBW  3 kHz      Delta 1 [T1 ]
                              *VBW 10 kHz                   -1.06 dB
Ref  34 dBm        *Att  40 dB   SWT 115 ms     314.000000000 kHz
  Offset  4 dB                   OBW248.000000000 kHz
-30                              Marker 1 [T1 ]
D1 23.88 dBm                                    -1.19 dBm
-20                                             1.879844000 GHz
                                 Temp 1 [T1 OBW]
-10                                             8.24 dBm
                                                1.879878000 GHz
                                 Temp 2 [T1 OBW]
D2 -2.12 dBm                                    8.56 dBm
 0                                              1.880126000 GHz
-10
-20
-30
-40
-50
-60
Center 1.88 GHz           100 kHz/              Span 1 MHz
```
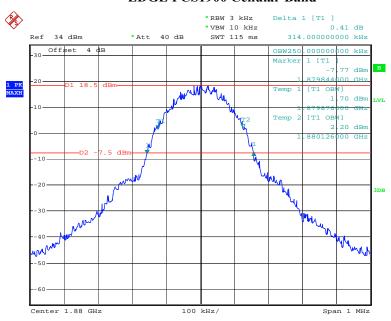
Date: 2.JAN.2018 22:02:39

EDGE 850 Cellular Band
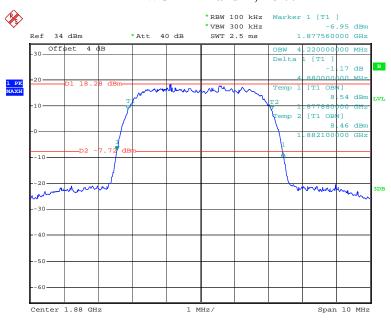
Date: 2.JAN.2018 21:38:33

EDGE PCS1900 Cellular Band
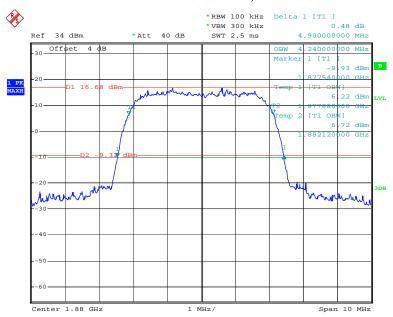
Date: 2.JAN.2018 21:53:51

WCDMA Band II, Rel 99
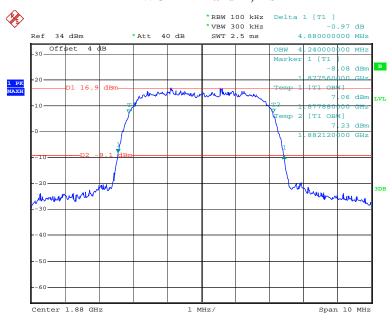
Date: 2.JAN.2018 21:22:23

WCDMA Band II, HSUPA
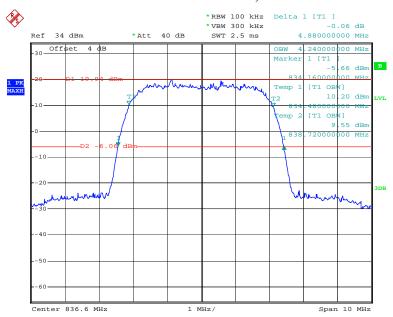

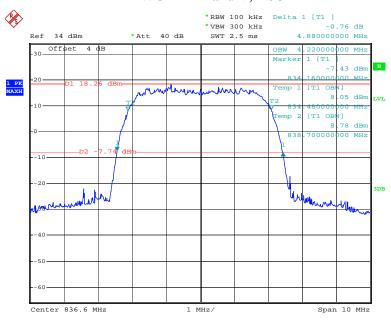Date: 2.JAN.2018 21:25:27

WCDMA Band II, HSDPA
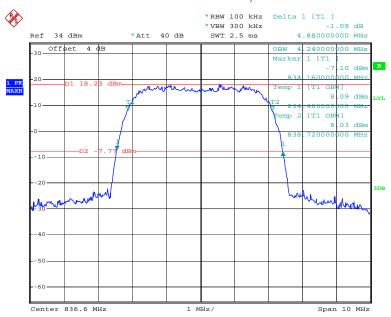

Date: 2.JAN.2018 21:24:02

WCDMA Band V, Rel 99

Date: 2.JAN.2018 21:27:26

WCDMA Band V, HSUPA

Date: 2.JAN.2018 20:29:07
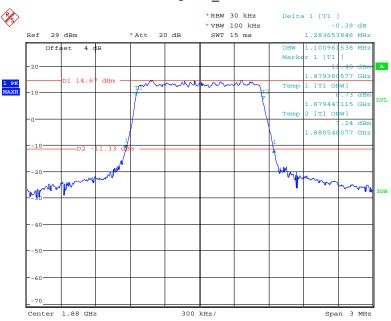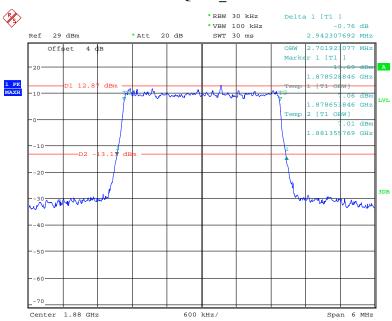
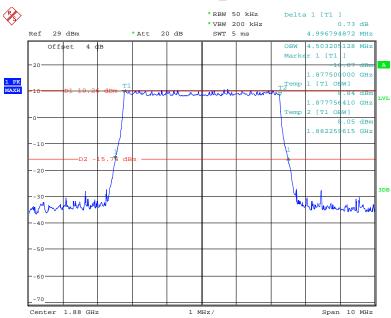## WCDMA Band V, HSDPA

Date: 2.JAN.2018 21:29:19

LTE Band 2

QPSK_1.4 MHz

Date: 30.JAN.2018 20:40:57

QPSK_3 MHz
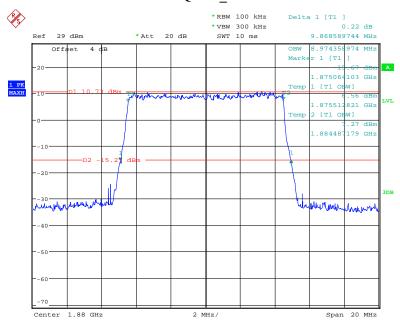
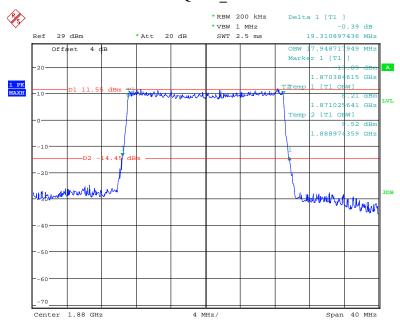Date: 30.JAN.2018 20:41:57

QPSK_5 MHz
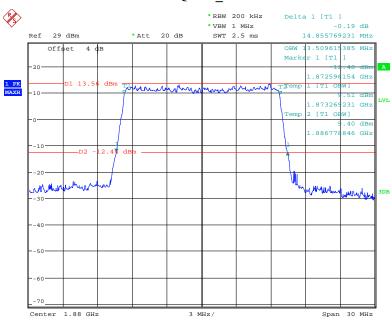
Date: 30.JAN.2018 20:43:04

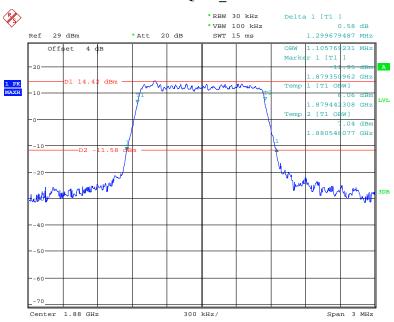## QPSK_10 MHz

Date: 30.JAN.2018 20:44:01

QPSK_15 MHz

Date: 30.JAN.2018 20:47:53

QPSK_20 MHz
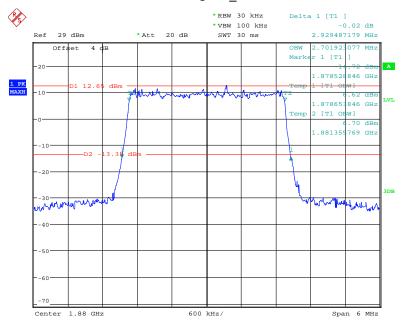

Date: 30.JAN.2018 20:49:05

16QAM_1.4 MHz

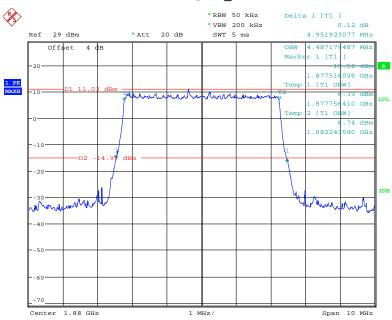Date: 30.JAN.2018 21:41:47

16QAM_3 MHz
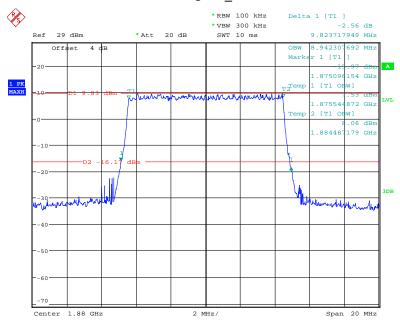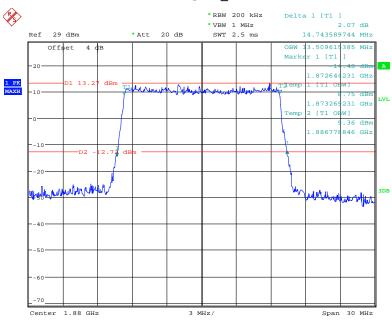

Date: 30.JAN.2018 21:41:16

16QAM_5 MHz

Date: 30.JAN.2018 21:40:44

16QAM_10 MHz

Date: 30.JAN.2018 21:39:19

16QAM_15 MHz

Date: 30.JAN.2018 21:38:39

16QAM_20 MHz

Date: 30.JAN.2018 21:38:05

LTE Band 4:

QPSK_1.4 MHz
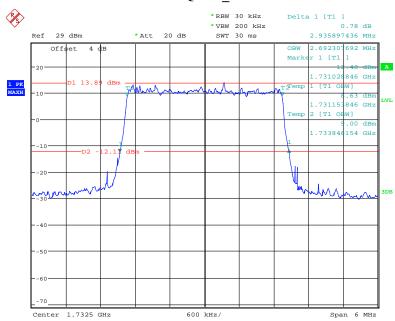
Date: 30.JAN.2018 21:00:34

QPSK_3 MHz
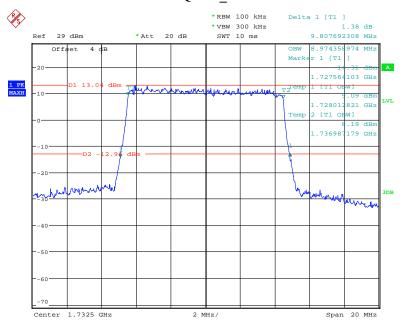
Date: 30.JAN.2018 20:59:46

QPSK_5 MHz
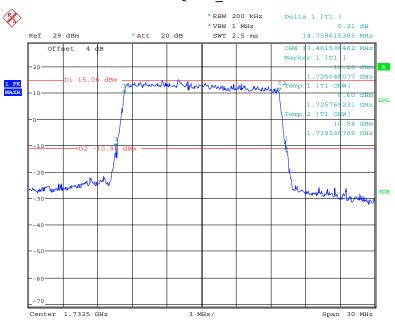
Date: 30.JAN.2018 20:58:08

QPSK_10 MHz
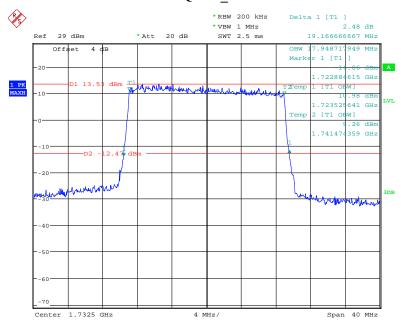
Date: 30.JAN.2018 20:57:21

QPSK_15 MHz
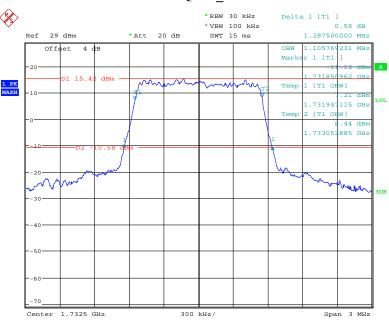
Date: 30.JAN.2018 20:56:30

QPSK_20 MHz
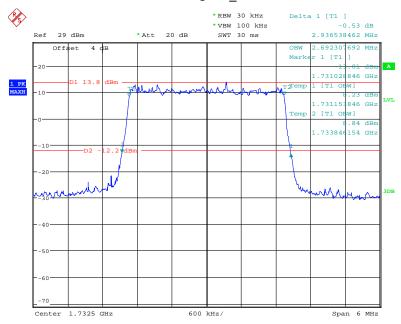
Date: 30.JAN.2018 20:53:17

16QAM_1.4 MHz
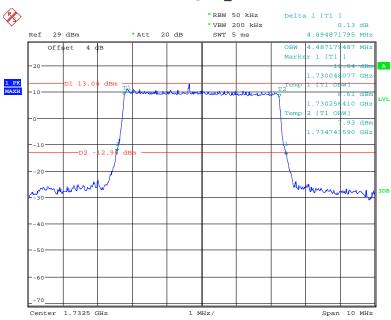
Date: 30.JAN.2018 21:30:39

16QAM_3 MHz
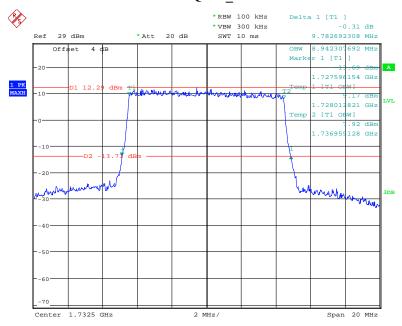
Date: 30.JAN.2018 21:31:12

16QAM_5 MHz
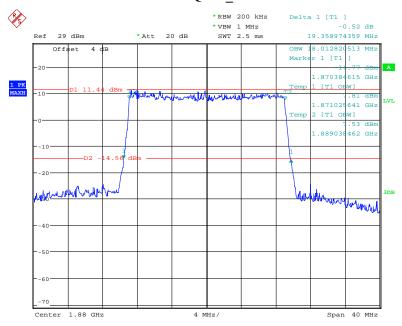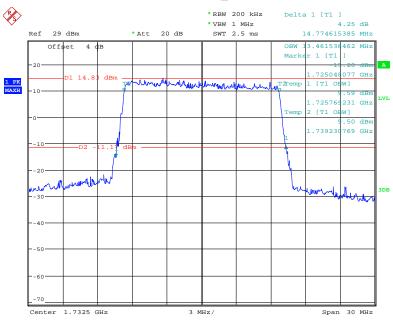

Date: 30.JAN.2018 21:31:51

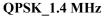## 16QAM_10 MHz
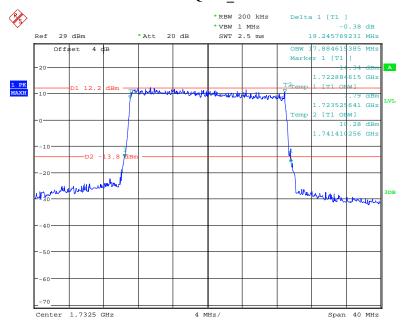
Date: 30.JAN.2018 21:34:44

16QAM_15 MHz

Date: 30.JAN.2018 21:35:36

16QAM_20 MHz
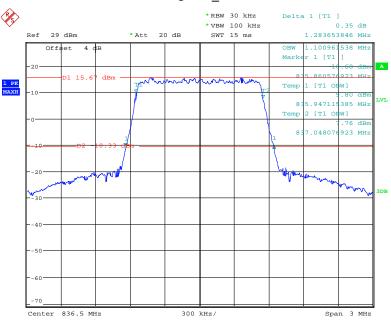
Date: 30.JAN.2018 21:36:16

LTE Band 5:

QPSK_1.4 MHz
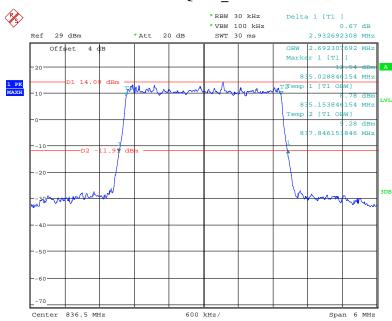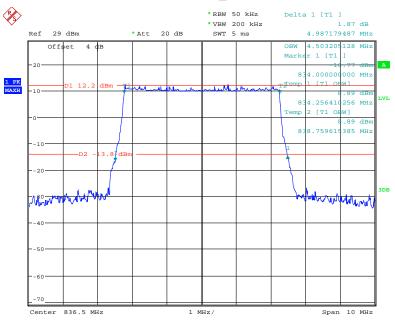
Date: 30.JAN.2018 21:02:44

QPSK_3 MHz
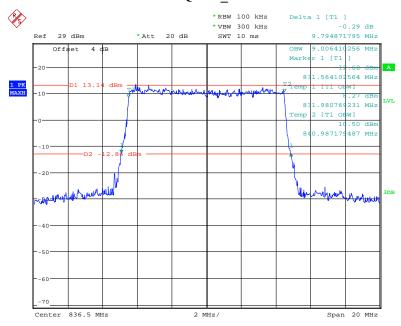
Date: 30.JAN.2018 21:03:55

QPSK_5 MHz
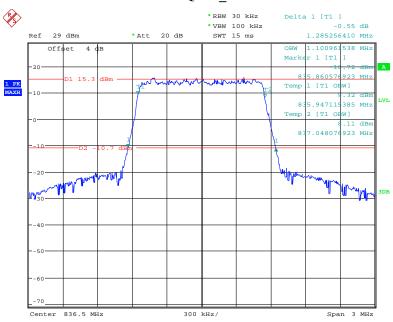
Date: 30.JAN.2018 21:04:53

QPSK_10 MHz
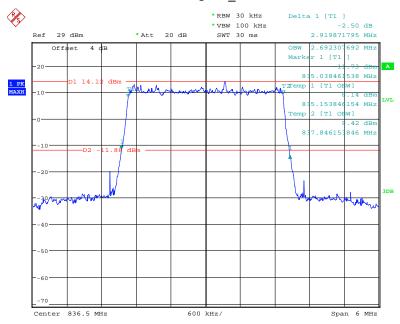
Date: 30.JAN.2018 21:08:41

16QAM_1.4 MHz
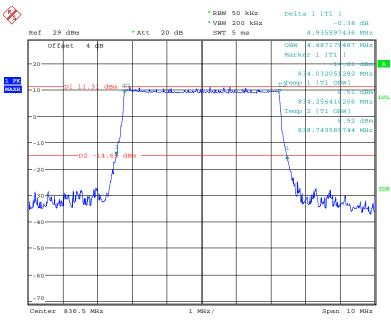
Date: 30.JAN.2018 21:28:33

16QAM_3 MHz
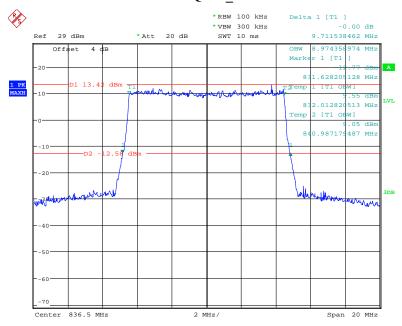
Date: 30.JAN.2018 21:28:00
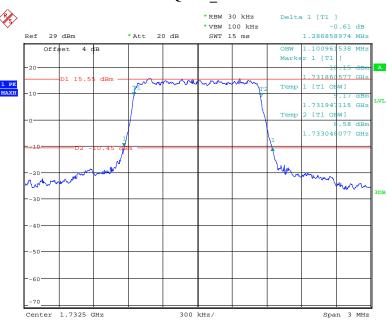
16QAM_5 MHz

Date: 30.JAN.2018 21:27:24

16QAM_10 MHz
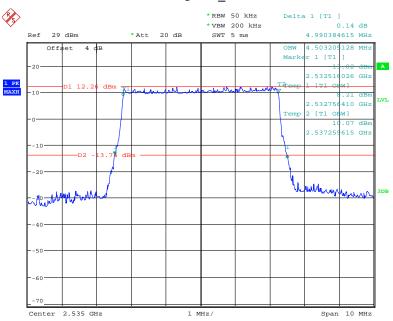
Date: 30.JAN.2018 21:26:45

LTE Band 7:

QPSK_5 MHz
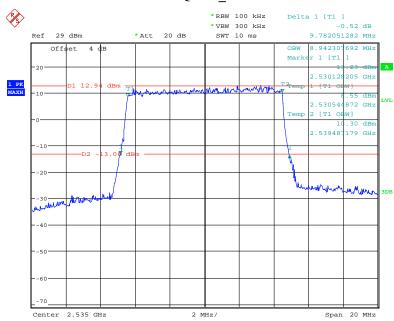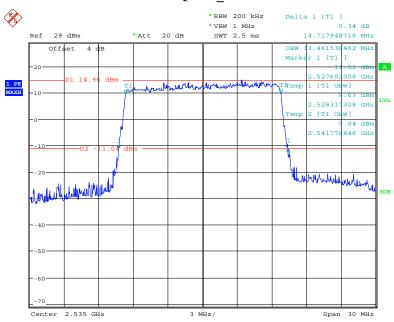
Date: 30.JAN.2018 21:11:01

QPSK_10 MHz
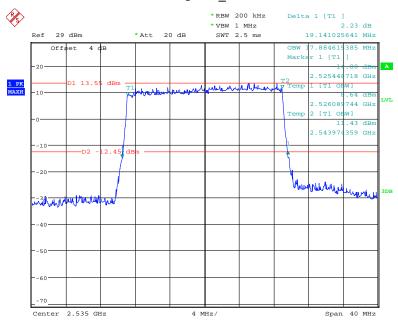
Date: 30.JAN.2018 21:11:48

QPSK_15 MHz
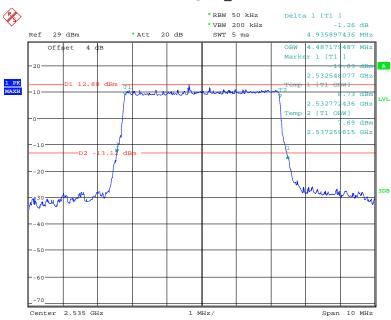
Date: 30.JAN.2018 21:12:47

QPSK_20 MHz
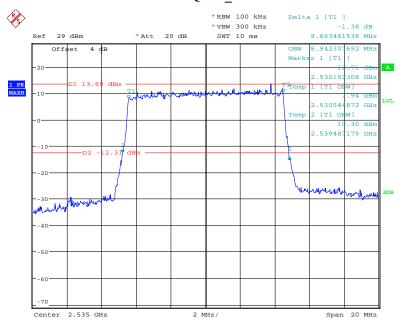
Date: 30.JAN.2018 21:13:43

16QAM_5 MHz
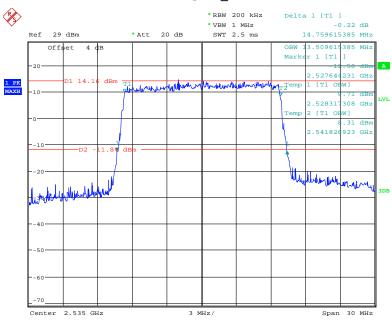
Date: 30.JAN.2018 21:22:02

16QAM_10 MHz
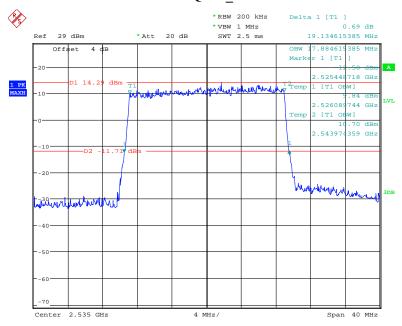
Date: 30.JAN.2018 21:22:52

16QAM_15 MHz

Date: 30.JAN.2018 21:23:28

16QAM_20 MHz
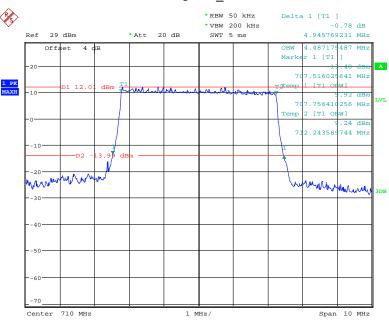
Date: 30.JAN.2018 21:24:06

LTE Band 17:

QPSK_5 MHz
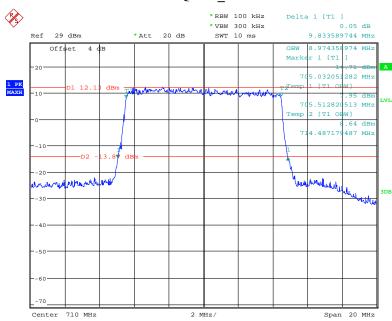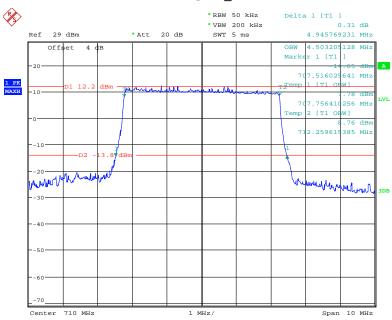
Date: 30.JAN.2018 21:16:07

QPSK_10 MHz

Date: 30.JAN.2018 21:16:57

16QAM_5 MHz

```
                                        * RBW  50 kHz    Delta 1 [T1 ]
                                        * VBW 200 kHz                  0.31 dB
        Ref   29 dBm        * Att  20 dB   SWT 5 ms              4.945769231 MHz
        Offset   4 dB                       OBW  4.503205128 MHz
                                            Marker 1 [T1 ]
                                                          14.65 dBm
                                            707.516025641 MHz
                                            Temp 1 [T1 OBW]
         D1 12.2 dBm                                         .78 dBm
                                            707.756410256 MHz
                                            Temp 2 [T1 OBW]
                                                          8.76 dBm
                                            712.259615385 MHz

         D2 -13.8 dBm


        Center 710 MHz              1 MHz/              Span  10 MHz
```

Date: 30.JAN.2018 21:19:18

16QAM_10 MHz

```
                                        * RBW 100 kHz    Delta 1 [T1 ]
                                        * VBW 300 kHz                 -0.22 dB
        Ref   29 dBm        * Att  20 dB   SWT 10 ms            9.673333333 MHz
        Offset   4 dB                       OBW  8.974358974 MHz
                                            Marker 1 [T1 ]
                                                          13.94 dBm
                                            705.160256410 MHz
         D1 12 dBm                           Temp 1 [T1 OBW]
                                                          8.56 dBm
                                            705.512820513 MHz
                                            Temp 2 [T1 OBW]
                                                          6.46 dBm
                                            714.487179487 MHz
         D2 -14 dBm


        Center 710 MHz              2 MHz/              Span  20 MHz
```

Date: 30.JAN.2018 21:18:39

FCC §2.1051, §22.917(a) & §24.238(a) & §27.53 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS
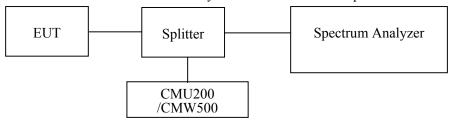
Applicable Standard

FCC §2.1051, §22.917(a) , §24.238(a) and §27.53.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/
R&S	Spectrum Analyzer	FSU 26	200256	2017-01-04	2018-01-04
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	22.4~24.1°C
Relative Humidity:	30~42 %
ATM Pressure:	100.9~101.5 kPa

The testing was performed by Harry Yang from 2018-01-02 to 2018-02-08.

Please refer to the following plots.

GSM850_Middle Channel
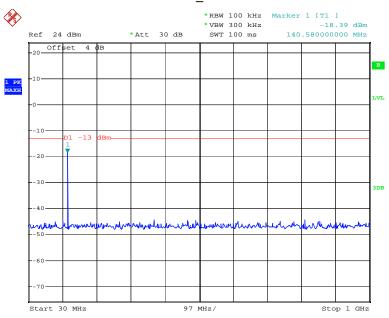
Date: 8.FEB.2018　16:59:12
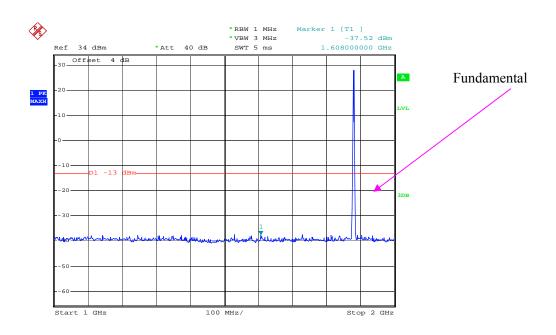
Date: 2.JAN.2018　21:49:32

PCS 1900_ Middle Channel

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz              -18.39 dBm
        Ref  24 dBm      *Att  30 dB   SWT 100 ms      140.580000000 MHz
```

Date: 2.JAN.2018 22:00:19

```
                                    *RBW 1 MHz    Marker 1 [T1 ]
                                    *VBW 3 MHz               -37.52 dBm
        Ref  34 dBm      *Att  40 dB   SWT 5 ms       1.608000000 GHz
```

Fundamental

Date: 8.FEB.2018 17:09:38

```
                                              *RBW 1 MHz    Marker 1 [T1 ]
                                              *VBW 3 MHz              -19.40 dBm
              Ref  24 dBm          *Att  30 dB   SWT 360 ms     14.816000000 GHz
```
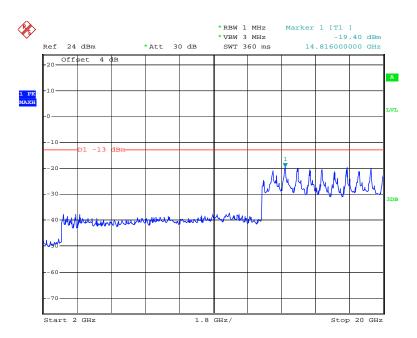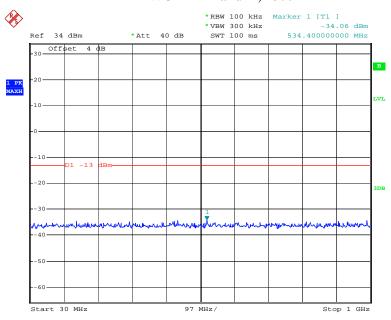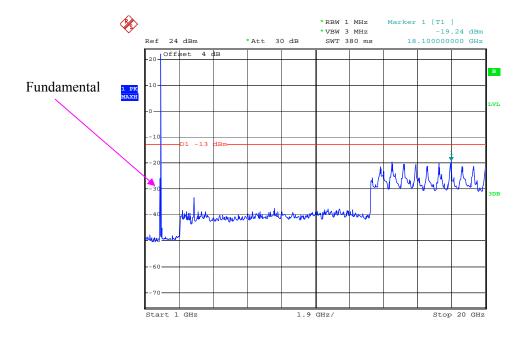


```
Date: 8.FEB.2018  17:10:09
```

WCDMA Band II,Rel99

```
                                          *RBW 100 kHz   Marker 1 [T1 ]
                                          *VBW 300 kHz          -34.06 dBm
         Ref  34 dBm        *Att  40 dB   SWT 100 ms     534.400000000 MHz
```

Date: 2.JAN.2018 21:31:23

```
                                          *RBW 1 MHz     Marker 1 [T1 ]
                                          *VBW 3 MHz            -19.24 dBm
         Ref  24 dBm        *Att  30 dB   SWT 380 ms     18.100000000 GHz
```

Fundamental
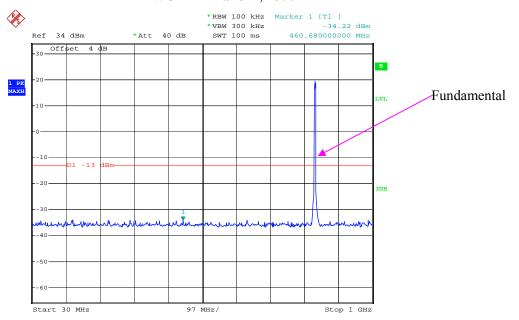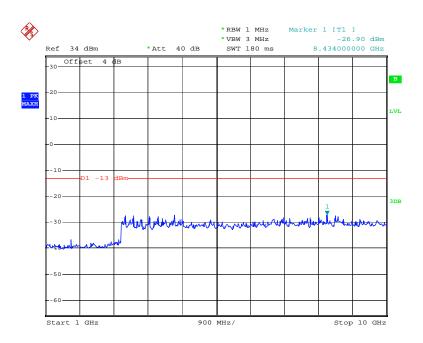
Date: 2.JAN.2018 21:32:02

WCDMA Band V,Rel99

```
                                    *RBW 100 kHz   Marker 1 [T1 ]
                                    *VBW 300 kHz              -34.22 dBm
       Ref  34 dBm        *Att  40 dB    SWT 100 ms      460.680000000 MHz
       Offset  4 dB
  -30
                                                                          B
  -20
1 PK                                                                      LVL
MAXH
  -10

   0

  -10
     D1 -13 dBm
  -20                                                                     3DB

  -30        1

  -40

  -50

  -60
  Start 30 MHz              97 MHz/              Stop 1 GHz
```

Fundamental

Date: 2.JAN.2018 20:57:10

```
                                    *RBW 1 MHz    Marker 1 [T1 ]
                                    *VBW 3 MHz              -26.90 dBm
       Ref  34 dBm        *Att  40 dB    SWT 180 ms       8.434000000 GHz
       Offset  4 dB
  -30
                                                                          B
  -20
1 PK                                                                      LVL
MAXH
  -10

   0

  -10
     D1 -13 dBm
  -20                                                                     3DB

  -30                                     1

  -40

  -50

  -60
  Start 1 GHz              900 MHz/             Stop 10 GHz
```
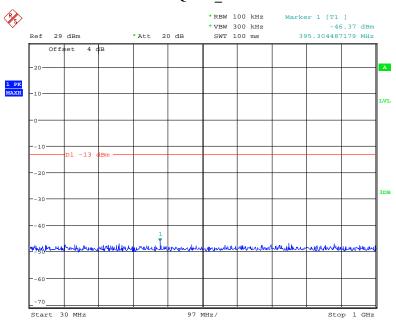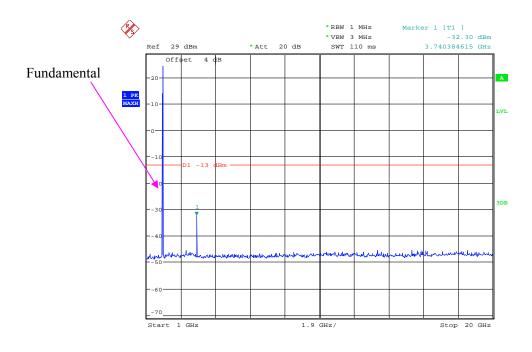
Date: 2.JAN.2018 20:57:50

LTE Band 2 (Middle Channel)

QPSK_1.4 MHz

```
                                    *RBW 100 kHz    Marker 1 [T1 ]
                                    *VBW 300 kHz                -46.37 dBm
       Ref   29 dBm     *Att  20 dB   SWT 100 ms     395.304487179 MHz
          Offset   4 dB                                                    A

    20
                                                                          LVL
    10

     0

   -10
          D1 -13 dBm                                                      3DB
   -20

   -30

   -40
                              1

   -50

   -60

   -70
       Start  30 MHz              97 MHz/              Stop  1 GHz
```

Date: 30.JAN.2018 21:43:33

Fundamental

```
                                    *RBW  1 MHz     Marker 1 [T1 ]
                                    *VBW  3 MHz                -32.30 dBm
       Ref   29 dBm     *Att  20 dB   SWT 110 ms      3.740384615 GHz
          Offset   4 dB                                                    A

    20
                                                                          LVL
    10

     0

   -10
          D1 -13 dBm                                                      3DB
   -20

   -30                   1

   -40

   -50

   -60

   -70
       Start  1 GHz              1.9 GHz/              Stop  20 GHz
```
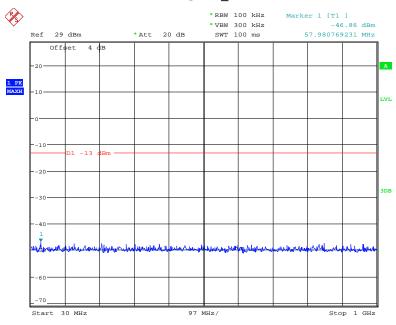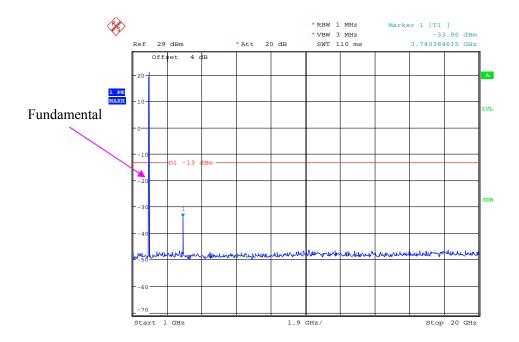
Date: 30.JAN.2018 21:44:25

QPSK_3 MHz

	* RBW 100 kHz　　Marker 1 [T1]
	* VBW 300 kHz　　　　　　-46.86 dBm
Ref 29 dBm　　　* Att 20 dB　SWT 100 ms	57.980769231 MHz

Offset 4 dB

1 PK
MAXH

D1 -13 dBm

A

LVL

3DB

Start 30 MHz　　　　97 MHz/　　　　Stop 1 GHz

Date: 30.JAN.2018　21:44:53

	* RBW 1 MHz　　Marker 1 [T1]
	* VBW 3 MHz　　　　　　-33.96 dBm
Ref 29 dBm　　　* Att 20 dB　SWT 110 ms	3.740384615 GHz

Offset 4 dB

1 PK
MAXH

Fundamental

D1 -13 dBm

A

LVL

3DB

Start 1 GHz　　　　1.9 GHz/　　　　Stop 20 GHz

Date: 30.JAN.2018　21:44:41

QPSK_5 MHz

```
                                    * RBW 100 kHz      Marker 1 [T1 ]
                                    * VBW 300 kHz              -47.43 dBm
         Ref   29 dBm      * Att  20 dB    SWT 100 ms    393.750000000 MHz
            Offset   4 dB                                              A
 20

 10                                                                   LVL

  0

-10
        D1 -13 dBm                                                    3DB
-20

-30

-40
                          1

-60

-70
        Start  30 MHz              97 MHz/              Stop  1 GHz
```

Date: 30.JAN.2018 21:45:06

```
                                    * RBW   1 MHz      Marker 1 [T1 ]
                                    * VBW   3 MHz              -35.93 dBm
         Ref   29 dBm      * Att  20 dB    SWT 110 ms    3.740384615 GHz
            Offset   4 dB                                              A
 20

 10                                                                   LVL

  0

-10
        D1 -13 dBm                                                    3DB
-20

-30           1

-40

-50

-60

-70
        Start  1 GHz               1.9 GHz/             Stop  20 GHz
```

Fundamental

Date: 30.JAN.2018 21:45:20

QPSK_10 MHz

```
                                    *RBW 100 kHz    Marker 1 [T1 ]
                                    *VBW 300 kHz              -47.36 dBm
        Ref  29 dBm      *Att  20 dB    SWT 100 ms       897.403846154 MHz
```

Offset 4 dB

D1 -13 dBm

Start 30 MHz   97 MHz/   Stop 1 GHz

Date: 30.JAN.2018 21:45:57

```
                                    *RBW 1 MHz     Marker 1 [T1 ]
                                    *VBW 3 MHz               -37.97 dBm
        Ref  29 dBm      *Att  20 dB    SWT 110 ms        3.740384615 GHz
```

Offset 4 dB

Fundamental

D1 -13 dBm

Start 1 GHz   1.9 GHz/   Stop 20 GHz

Date: 30.JAN.2018 21:45:43

QPSK_15 MHz

```
                                    * RBW  100 kHz      Marker 1 [T1 ]
                                    * VBW  300 kHz              -45.40 dBm
        Ref  29 dBm       * Att  20 dB    SWT  100 ms     931.602564103 MHz
          Offset  4 dB
                                                                          A
    20

    10                                                                    LVL

     0

   -10
        D1 -13 dBm                                                        3DB
   -20

   -30

   -40                                                        1

   -50

   -60

   -70
    Start  30 MHz              97 MHz/                    Stop  1 GHz
```

Date: 30.JAN.2018 21:46:10

```
                                    * RBW  1 MHz       Marker 1 [T1 ]
                                    * VBW  3 MHz               -39.15 dBm
        Ref  29 dBm       * Att  20 dB    SWT  110 ms    3.770833333 GHz
          Offset  4 dB
                                                                          A
    20

    10                                                                    LVL

     0

   -10
        D1 -13 dBm                                                        3DB
   -20

   -30

   -40              1

   -50

   -60

   -70
    Start  1 GHz               1.9 GHz/                   Stop  20 GHz
```

Fundamental
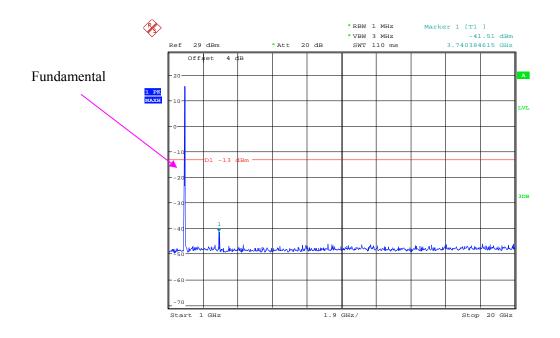
Date: 30.JAN.2018 21:46:27

QPSK_20 MHz

```
                                    * RBW 100 kHz      Marker 1 [T1 ]
                                    * VBW 300 kHz                 -45.98 dBm
         Ref  29 dBm       * Att  20 dB    SWT 100 ms      914.503205128 MHz
           Offset   4 dB
```

```
Date: 30.JAN.2018  21:46:54
```

Fundamental

```
                                    * RBW 1 MHz        Marker 1 [T1 ]
                                    * VBW 3 MHz                  -41.51 dBm
         Ref  29 dBm       * Att  20 dB    SWT 110 ms      3.740384615 GHz
           Offset   4 dB
```
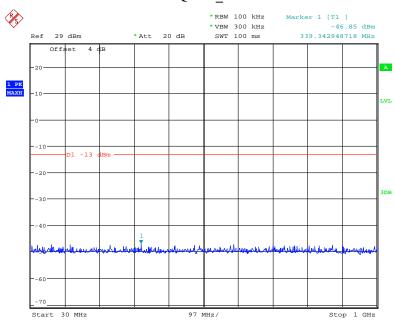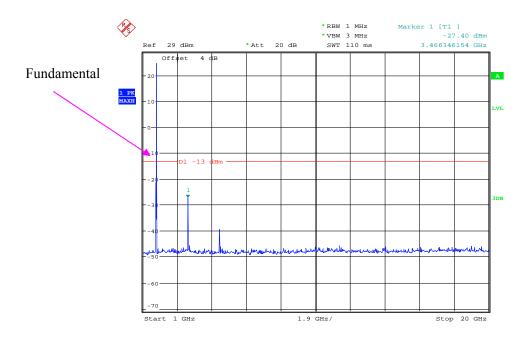
```
Date: 30.JAN.2018  21:46:42
```

LTE Band 4 (Middle Channel)

QPSK_1.4 MHz

```
                                        *RBW  100 kHz      Marker 1 [T1 ]
                                        *VBW  300 kHz                -46.85 dBm
             Ref   29 dBm      *Att  20 dB    SWT  100 ms    339.342948718 MHz
                Offset   4 dB                                              A

   20

   10                                                                   LVL

    0

  -10
            D1 -13 dBm                                                   3DB
  -20

  -30

  -40
                              1
  -60

  -70
             Start  30 MHz              97 MHz/              Stop  1 GHz
```

Date: 30.JAN.2018 21:49:23

Fundamental

```
                                        *RBW  1 MHz        Marker 1 [T1 ]
                                        *VBW  3 MHz                 -27.40 dBm
             Ref   29 dBm      *Att  20 dB    SWT  110 ms    3.466346154 GHz
                Offset   4 dB                                              A

   20

   10                                                                   LVL

    0

  -10
            D1 -13 dBm                                                   3DB
  -20
                              1
  -30

  -40

  -50

  -60

  -70
             Start  1 GHz              1.9 GHz/             Stop  20 GHz
```

Date: 30.JAN.2018 21:49:42

QPSK_3 MHz

```
                                    * RBW  100 kHz     Marker 1 [T1 ]
                                    * VBW  300 kHz             -46.67 dBm
        Ref   29 dBm      * Att  20 dB    SWT 100 ms      61.089743590 MHz
          Offset   4 dB                                                    A
    -20
    -10                                                                    LVL
      0
    -10
        D1 -13 dBm                                                         3DB
    -20
    -30
    -40
          1
    -50
    -60
    -70
     Start 30 MHz                    97 MHz/                    Stop 1 GHz
```

Date: 30.JAN.2018 21:50:56

```
                                    * RBW   1 MHz     Marker 1 [T1 ]
                                    * VBW   3 MHz             -30.95 dBm
        Ref   29 dBm      * Att  20 dB    SWT 110 ms      3.466346154 GHz
          Offset   4 dB                                                    A
    -20
Fundamental
    -10                                                                    LVL
      0
    -10
        D1 -13 dBm                                                         3DB
    -20
    -30        1
    -40
    -50
    -60
    -70
     Start 1 GHz                    1.9 GHz/                   Stop 20 GHz
```

Date: 30.JAN.2018 21:49:55

QPSK_5 MHz

```
                              * RBW 100 kHz    Marker 1 [T1 ]
                              * VBW 300 kHz            -46.24 dBm
   Ref  29 dBm     * Att  20 dB   SWT 100 ms     113.942307692 MHz
      Offset  4 dB
```

Date: 30.JAN.2018 21:51:06

Fundamental

```
                              * RBW  1 MHz    Marker 1 [T1 ]
                              * VBW  3 MHz            -32.91 dBm
   Ref  29 dBm     * Att  20 dB   SWT 110 ms     3.466346154 GHz
      Offset  4 dB
```
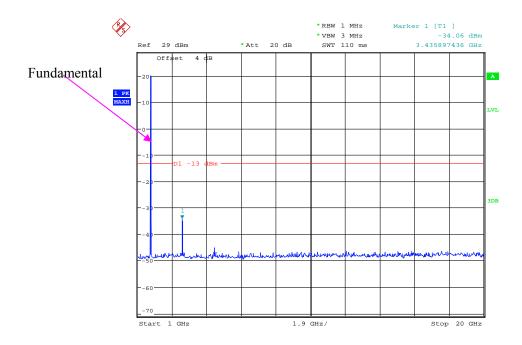
Date: 30.JAN.2018 21:51:18

QPSK_10 MHz
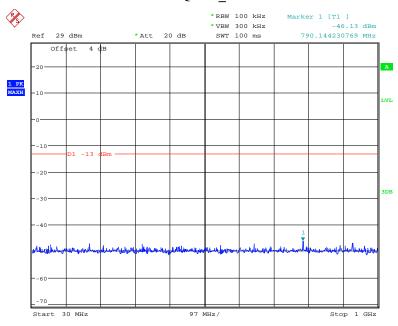
Date: 30.JAN.2018 21:51:44

Fundamental
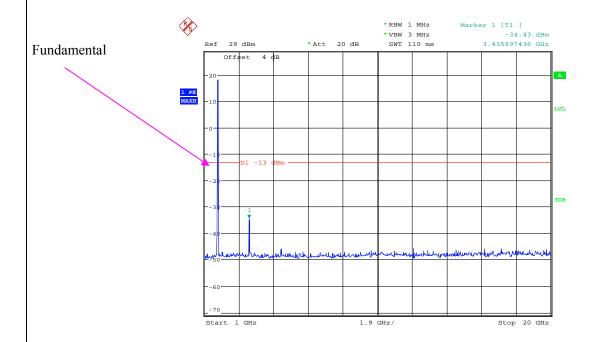
Date: 30.JAN.2018 21:51:33

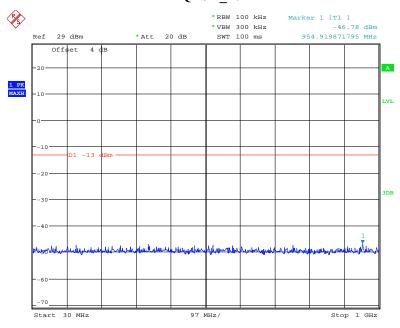## QPSK_15 MHz

```
                                        * RBW  100 kHz     Marker 1 [T1 ]
                                        * VBW  300 kHz              -46.13 dBm
        Ref  29 dBm          * Att  20 dB    SWT 100 ms      790.144230769 MHz
           Offset  4 dB
```



```
Start  30 MHz              97 MHz/                    Stop  1 GHz
```

Date: 30.JAN.2018 21:51:53

Fundamental

```
                                        * RBW  1 MHz      Marker 1 [T1 ]
                                        * VBW  3 MHz               -34.43 dBm
        Ref  29 dBm          * Att  20 dB    SWT 110 ms       3.435897436 GHz
           Offset  4 dB
```



```
Start  1 GHz              1.9 GHz/                   Stop  20 GHz
```
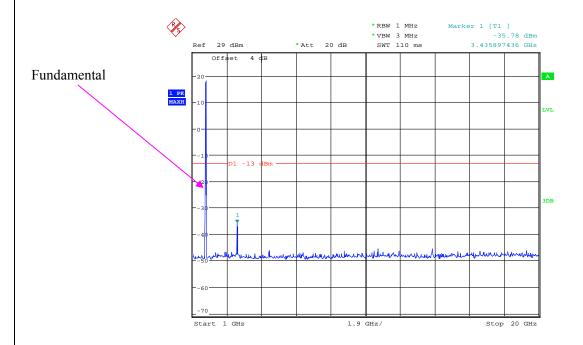
Date: 30.JAN.2018 21:52:53

QPSK_20 MHz

```
                                    * RBW 100 kHz    Marker 1 [T1 ]
                                    * VBW 300 kHz              -46.78 dBm
    Ref  29 dBm        * Att  20 dB   SWT 100 ms      954.919871795 MHz
         Offset  4 dB                                             A

 1 PK
 MAXH                                                            LVL

                     D1 -13 dBm                                  3DB



                                                        1
```

Date: 30.JAN.2018 21:53:29

Fundamental

```
                                    * RBW 1 MHz      Marker 1 [T1 ]
                                    * VBW 3 MHz               -35.78 dBm
    Ref  29 dBm        * Att  20 dB   SWT 110 ms      3.435897436 GHz
         Offset  4 dB                                             A

 1 PK
 MAXH                                                            LVL

                     D1 -13 dBm                                  3DB

            1

 Start  1 GHz           1.9 GHz/              Stop  20 GHz
```
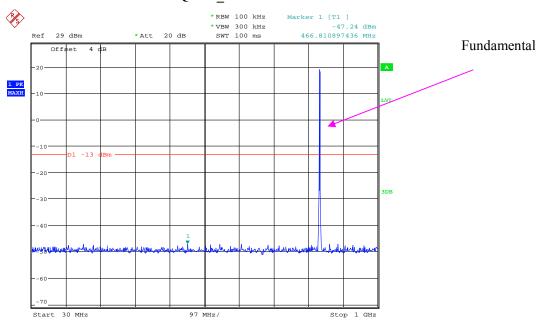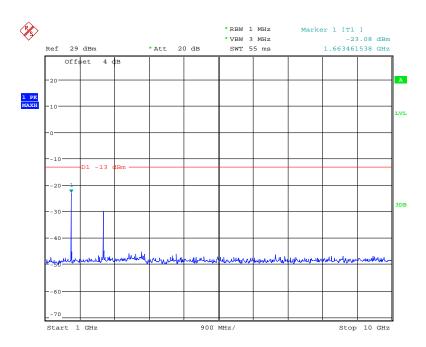
Date: 30.JAN.2018 21:53:15

LTE Band 5 (Middle Channel)

QPSK_1.4 MHz

Fundamental
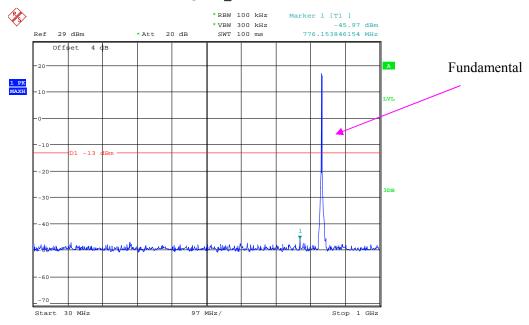
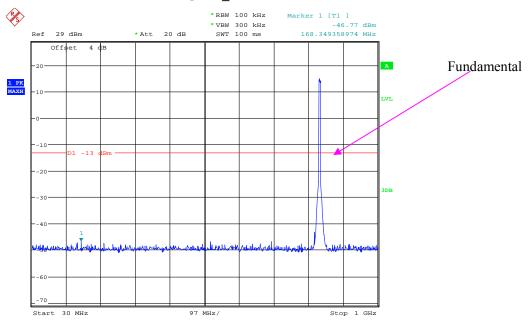Date: 30.JAN.2018 21:58:46
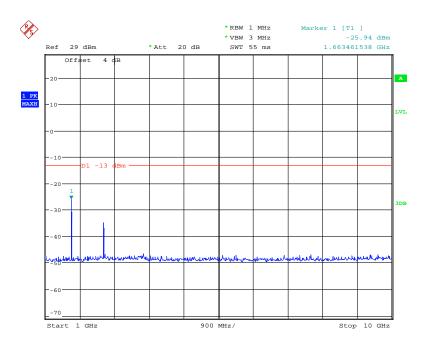
Date: 30.JAN.2018 21:58:29

QPSK_3 MHz

```
                                   * RBW 100 kHz     Marker 1 [T1 ]
                                   * VBW 300 kHz              -45.97 dBm
        Ref  29 dBm    * Att  20 dB   SWT 100 ms     776.153846154 MHz
            Offset   4 dB
```

Fundamental

```
        Start  30 MHz              97 MHz/               Stop  1 GHz
```

Date: 30.JAN.2018 21:58:00

```
                                   * RBW  1 MHz      Marker 1 [T1 ]
                                   * VBW  3 MHz              -25.94 dBm
        Ref  29 dBm    * Att  20 dB   SWT 55 ms      1.663461538 GHz
            Offset   4 dB
```

```
        Start  1 GHz               900 MHz/              Stop 10 GHz
```
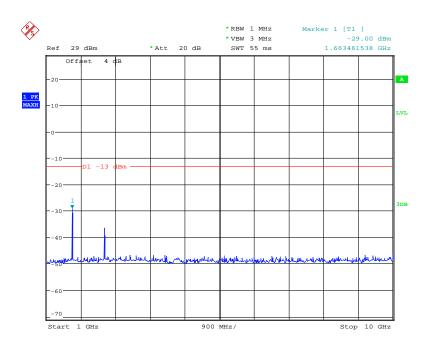
Date: 30.JAN.2018 21:58:13

QPSK_5 MHz

```
                                        * RBW 100 kHz    Marker 1 [T1 ]
                                        * VBW 300 kHz              -46.77 dBm
          Ref  29 dBm        * Att  20 dB   SWT 100 ms    168.349358974 MHz
```

Fundamental

```
Date: 30.JAN.2018  21:57:38
```

```
                                        * RBW 1 MHz     Marker 1 [T1 ]
                                        * VBW 3 MHz              -29.00 dBm
          Ref  29 dBm        * Att  20 dB   SWT 55 ms     1.663461538 GHz
```
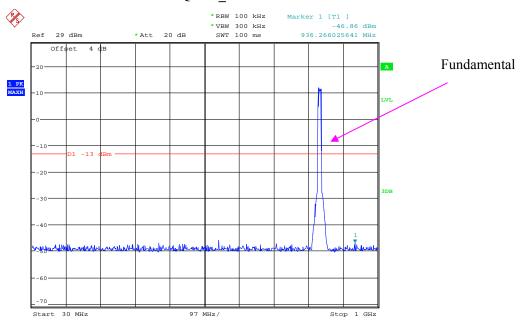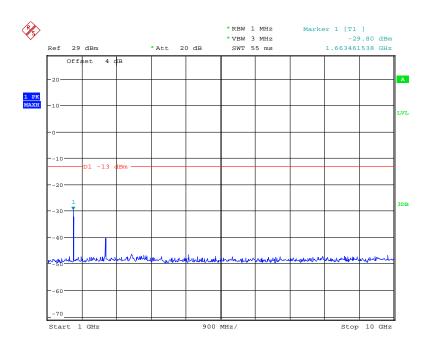
```
Date: 30.JAN.2018  21:57:21
```

QPSK_10 MHz

```
                                    * RBW 100 kHz      Marker 1 [T1 ]
                                    * VBW 300 kHz              -46.86 dBm
       Ref   29 dBm      * Att  20 dB    SWT 100 ms      936.266025641 MHz
          Offset   4 dB                                                    A

    20                                                                           Fundamental

    10                                                      LVL

     0

   -10
         D1 -13 dBm                                         3DB
   -20

   -30

   -40
                                                    1
   -50

   -60

   -70
       Start  30 MHz            97 MHz/              Stop  1 GHz
```

Date: 30.JAN.2018 21:56:39

```
                                    * RBW  1 MHz      Marker 1 [T1 ]
                                    * VBW  3 MHz              -29.80 dBm
       Ref   29 dBm      * Att  20 dB    SWT 55 ms      1.663461538 GHz
          Offset   4 dB                                                    A

    20

    10                                                      LVL

     0

   -10
         D1 -13 dBm                                         3DB
   -20

   -30   1

   -40

   -50

   -60

   -70
       Start  1 GHz            900 MHz/              Stop  10 GHz
```
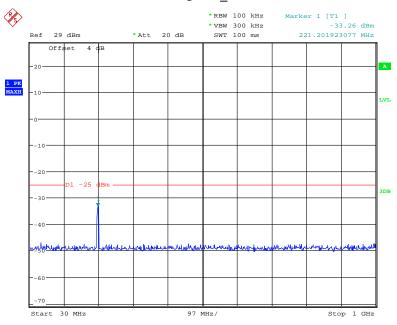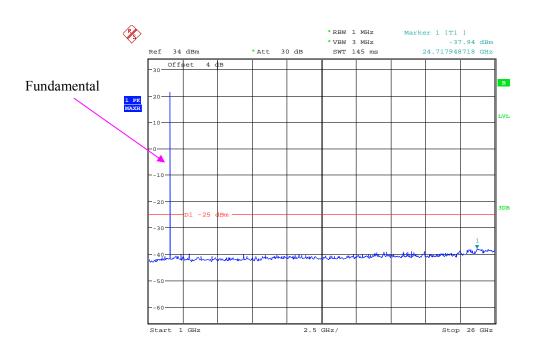
Date: 30.JAN.2018 21:56:55

LTE Band 7

QPSK_5 MHz

```
                                    *RBW 100 kHz    Marker 1 [T1 ]
                                    *VBW 300 kHz              -33.26 dBm
       Ref   29 dBm      *Att  20 dB    SWT 100 ms      221.201923077 MHz
```

Date: 30.JAN.2018 22:01:59

Fundamental

```
                                    *RBW 1 MHz     Marker 1 [T1 ]
                                    *VBW 3 MHz              -37.94 dBm
       Ref   34 dBm      *Att  30 dB    SWT 145 ms       24.717948718 GHz
```
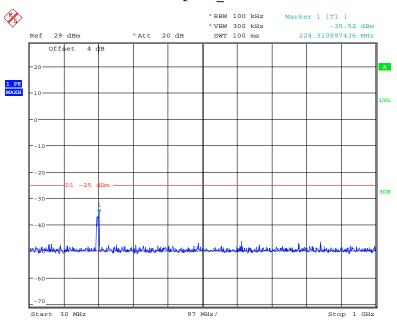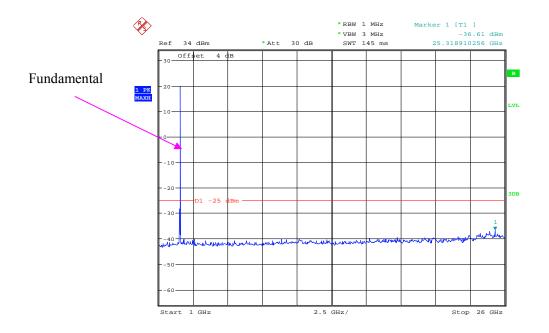
Date: 8.FEB.2018 17:30:51

QPSK_10 MHz
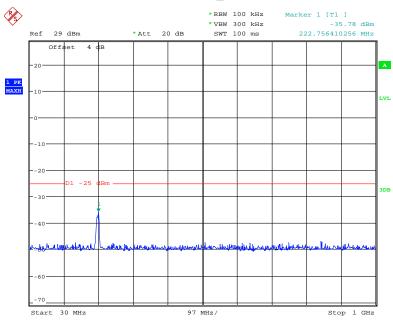
Date: 30.JAN.2018 22:02:58

Fundamental
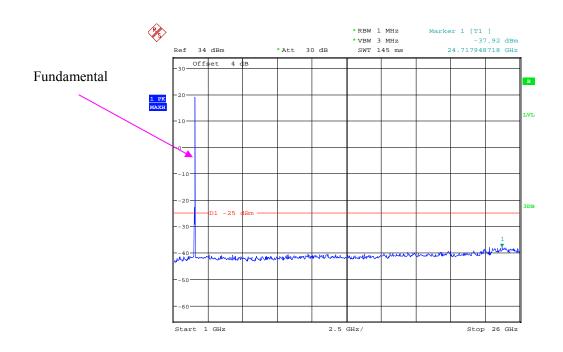
Date: 8.FEB.2018 17:31:42

QPSK_15 MHz

```
                                        *RBW 100 kHz      Marker 1 [T1 ]
                                        *VBW 300 kHz                -35.78 dBm
        Ref  29 dBm         *Att  20 dB    SWT 100 ms        222.756410256 MHz
```

Date: 30.JAN.2018 22:04:24

Fundamental

```
                                        *RBW 1 MHz        Marker 1 [T1 ]
                                        *VBW 3 MHz                  -37.92 dBm
        Ref  34 dBm         *Att  30 dB    SWT 145 ms         24.717948718 GHz
```
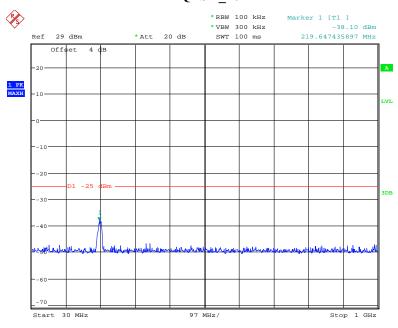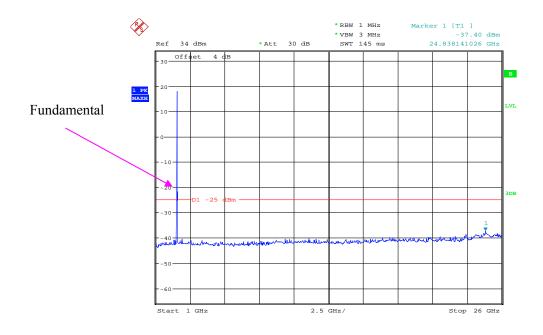
Date: 8.FEB.2018 17:32:38

QPSK_20 MHz

```
                                        *RBW  100 kHz      Marker 1 [T1 ]
                                        *VBW  300 kHz              -38.10 dBm
          Ref   29 dBm        *Att  20 dB    SWT  100 ms     219.647435897 MHz
            Offset  4 dB
                                                                              A

  1 PK                                                                         LVL
  MAXH

                             D1 -25 dBm                                        3DB

                             1
```

Date: 30.JAN.2018 22:05:42

```
                                        *RBW  1 MHz        Marker 1 [T1 ]
                                        *VBW  3 MHz                -37.40 dBm
          Ref   34 dBm        *Att  30 dB    SWT  145 ms      24.838141026 GHz
            Offset  4 dB
                                                                              B

  1 PK                                                                         LVL
  MAXH

Fundamental

                             D1 -25 dBm                                        3DB
                                                                    1
```
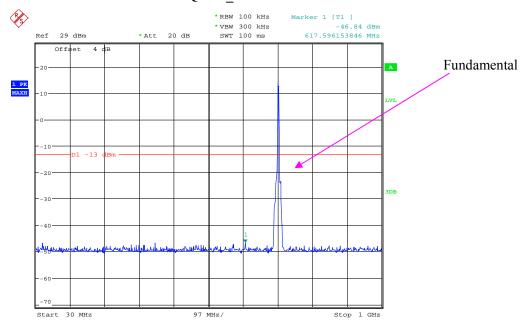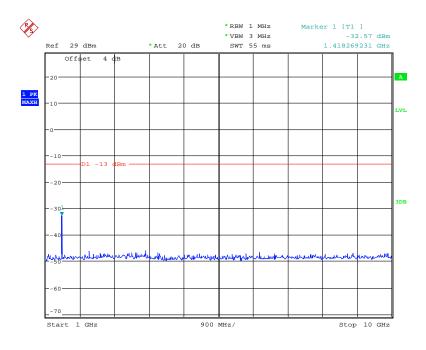
Date: 8.FEB.2018 17:33:21

LTE Band 17 (Middle Channel)

QPSK_5 MHz

```
                                          *RBW 100 kHz    Marker 1 [T1 ]
                                          *VBW 300 kHz              -46.84 dBm
        Ref  29 dBm           *Att  20 dB   SWT 100 ms       617.596153846 MHz
           Offset  4 dB                                                   A

     20

     10                                                                  LVL

      0

    -10
         D1 -13 dBm                                                      3DB
    -20

    -30

    -40
                                    1
    -50
    -60

    -70
        Start  30 MHz            97 MHz/               Stop  1 GHz
```

Fundamental

Date: 30.JAN.2018 22:27:34

```
                                          *RBW 1 MHz      Marker 1 [T1 ]
                                          *VBW 3 MHz               -32.57 dBm
        Ref  29 dBm           *Att  20 dB   SWT 55 ms       1.418269231 GHz
           Offset  4 dB                                                   A

     20

     10                                                                  LVL

      0

    -10
         D1 -13 dBm                                                      3DB
    -20

    -30
    -40

    -50
    -60

    -70
        Start  1 GHz             900 MHz/              Stop  10 GHz
```
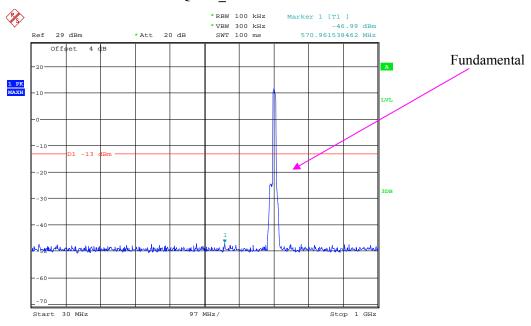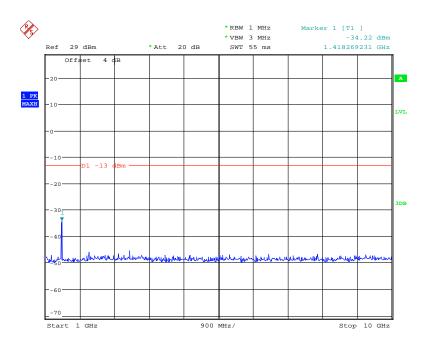
Date: 30.JAN.2018 22:27:52

QPSK_10 MHz

```
                                    * RBW 100 kHz    Marker 1 [T1 ]
                                    * VBW 300 kHz              -46.99 dBm
         Ref   29 dBm       * Att  20 dB    SWT 100 ms     570.961538462 MHz
            Offset   4 dB
                                                                          A
   20
                                                                        Fundamental
   10
                                                                          LVL
    0
  -10
        D1 -13 dBm
  -20
                                                                          3DB
  -30
  -40
  -50
  -60
  -70
         Start  30 MHz              97 MHz/                Stop  1 GHz
```

Date: 30.JAN.2018 22:29:13

```
                                    * RBW  1 MHz     Marker 1 [T1 ]
                                    * VBW  3 MHz              -34.22 dBm
         Ref   29 dBm       * Att  20 dB    SWT 55 ms      1.418269231 GHz
            Offset   4 dB
                                                                          A
   20
   10
                                                                          LVL
    0
  -10
        D1 -13 dBm
  -20
                                                                          3DB
  -30
  -40
  -50
  -60
  -70
         Start  1 GHz                900 MHz/                Stop  10 GHz
```

Date: 30.JAN.2018 22:28:55

FCC §2.1053, §22.917 & §24.238 & §27.53 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, §22.917, § 24.238 and § 27.53.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = $43 + 10 \log_{10}$ (power out in Watts)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESCI	100035	2017-08-04	2018-08-04
Sunol Sciences	Antenna	JB3	A060611-3	2017-07-21	2019-07-21
HP	Amplifier	8447F	2443A01912	2017-09-05	2018-09-05
R&S	Spectrum Analyzer	FSU 26	200256	2017-01-04	2018-01-04
ETS LINDGREN	Horn Antenna	3115	000 527 35	2016-01-05	2019-01-04
Mini-Circuit	Amplifier	AFS42-00101800-25-S-42	2001271	2017-09-05	2018-09-05
HP	Signal Generator	1026	320408	2017-12-08	2018-12-08
EMCO	Adjustable Dipole Antenna	3121C	9109-753	N/A	N/A
TDK RF	Horn Antenna	HRN-0118	130 084	2016-01-05	2019-01-04
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-02 1304	2017-06-16	2020-06-15
Ducommun Technolagies	Horn Antenna	ARH-4223-02	1007726-01 1304	2016-11-18	2019-11-18
Unknown	Coaxial Cable	C-NJNJ-50	C-0400-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-0075-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-NJNJ-50	C-1000-01	2017-09-05	2018-09-05
Unknown	Coaxial Cable	C-SJSJ-50	C-0800-01	2017-09-05	2018-09-05

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	21.9°C
Relative Humidity:	38 %
ATM Pressure:	100.9 kPa

* The testing was performed by Blake Yang & Eric Xiao on 2018-01-02

EUT Operation Mode: Transmitting

Cellular Band (PART 22H)

30 MHz-10 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM850, Frequency:836.600 MHz								
1673.200	H	55.48	-47.2	10.5	1.3	-38.0	-13.0	25.0
1673.200	V	52.33	-50.3	10.5	1.3	-41.1	-13.0	28.1
2509.800	H	57.36	-43.4	12.2	1.2	-32.4	-13.0	19.4
2509.800	V	56.40	-45.7	12.2	1.2	-34.7	-13.0	21.7
3346.400	H	50.75	-48.2	12.3	1.6	-37.5	-13.0	24.5
3346.400	V	48.51	-49.4	12.3	1.6	-38.7	-13.0	25.7
198.780	H	46.48	-62.2	0.0	0.5	-62.7	-13.0	49.7
62.980	V	46.21	-63.1	-8.7	0.2	-72.0	-13.0	59.0

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
WCDMA Band V R99,Frequency:836.600 MHz								
1673.200	H	40.06	-62.6	10.5	1.3	-53.4	-13.0	40.4
1673.200	V	39.11	-63.5	10.5	1.3	-54.3	-13.0	41.3
2509.800	H	38.24	-62.5	12.2	1.2	-51.5	-13.0	38.5
2509.800	V	39.44	-62.7	12.2	1.2	-51.7	-13.0	38.7
3346.400	H	37.34	-61.6	12.3	1.6	-50.9	-13.0	37.9
3346.400	V	36.13	-61.8	12.3	1.6	-51.1	-13.0	38.1
198.780	H	45.53	-63.2	0.0	0.5	-63.7	-13.0	50.7
62.980	V	46.38	-62.9	-8.7	0.2	-71.8	-13.0	58.8

PCS Band (PART 24E)

30 MHz-20 GHz:

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBµV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
GSM1900, Frequency:1880.000 MHz								
3760.000	H	51.89	-45.8	12.3	1.5	-35.0	-13.0	22.0
3760.000	V	50.67	-46.7	12.3	1.5	-35.9	-13.0	22.9
5640.000	H	43.37	-49	13.0	1.3	-37.3	-13.0	24.3
5640.000	V	47.69	-45	13.0	1.3	-33.3	-13.0	20.3
198.780	H	46.12	-62.6	0.0	0.5	-63.1	-13.0	50.1
62.980	V	45.90	-63.4	-8.7	0.2	-72.3	-13.0	59.3
WCDMA Band II, R99, Frequency:1880.000 MHz								
3760.000	H	51.23	-46.5	12.3	1.5	-35.7	-13.0	22.7
3760.000	V	47.95	-49.5	12.3	1.5	-38.7	-13.0	25.7
5640.000	H	37.31	-55.1	13.0	1.3	-43.4	-13.0	30.4
5640.000	V	35.42	-57.3	13.0	1.3	-45.6	-13.0	32.6
198.780	H	45.80	-62.9	0.0	0.5	-63.4	-13.0	50.4
62.980	V	46.82	-62.5	-8.7	0.2	-71.4	-13.0	58.4

LTE Band 2 (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:1880.000 MHz								
3760.000	H	51.57	-46.1	12.3	1.5	-35.3	-13.0	22.3
3760.000	V	47.83	-49.6	12.3	1.5	-38.8	-13.0	25.8
5640.000	H	44.46	-47.9	13.0	1.3	-36.2	-13.0	23.2
5640.000	V	43.39	-49.3	13.0	1.3	-37.6	-13.0	24.6
299.660	H	42.52	-66.1	0.0	0.5	-66.6	-13.0	53.6
299.660	V	44.41	-65.6	0.0	0.5	-66.1	-13.0	53.1

LTE Band 4 (30MHz-20GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:1732.500 MHz								
3465.000	H	49.68	-49	12.2	1.6	-38.4	-13.0	25.4
3465.000	V	47.53	-49.8	12.2	1.6	-39.2	-13.0	26.2
5197.500	H	45.21	-48	12.9	1.4	-36.5	-13.0	23.5
5197.500	V	43.36	-49.8	12.9	1.4	-38.3	-13.0	25.3
299.660	H	42.16	-66.5	0.0	0.5	-67.0	-13.0	54.0
299.660	V	43.80	-66.2	0.0	0.5	-66.7	-13.0	53.7

LTE Band 5 (30MHz-10GHz):

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency: 836.500 MHz								
1673.000	H	48.57	-54.1	10.5	1.3	-44.9	-13.0	31.9
1673.000	V	46.24	-56.4	10.5	1.3	-47.2	-13.0	34.2
2509.500	H	50.24	-50.5	12.2	1.2	-39.5	-13.0	26.5
2509.500	V	49.16	-53	12.2	1.2	-42.0	-13.0	29.0
3346.000	H	45.21	-53.7	12.3	1.6	-43.0	-13.0	30.0
3346.000	V	43.05	-54.8	12.3	1.6	-44.1	-13.0	31.1
299.660	H	44.51	-64.1	0.0	0.5	-64.6	-13.0	51.6
299.660	V	43.25	-66.7	0.0	0.5	-67.2	-13.0	54.2

LTE Band 7 (30MHz-26GHz)

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:2535.000 MHz								
5070.000	H	48.24	-45.1	13.0	1.4	-33.5	-25.0	8.5
5070.000	V	46.38	-46.7	13.0	1.4	-35.1	-25.0	10.1
7605.000	H	45.37	-42.7	12.8	1.4	-31.3	-25.0	6.3
7605.000	V	43.20	-45.5	12.8	1.4	-34.1	-25.0	9.1
299.660	H	44.56	-64.1	0.0	0.5	-64.6	-25.0	39.6
299.660	V	43.10	-66.9	0.0	0.5	-67.4	-25.0	42.4

LTE Band 17 (30MHz-10GHz)

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Substituted Level (dBm)	Antenna Gain (dBd/dBi)	Cable Loss (dB)			
QPSK,Frequency:710.000 MHz								
1420.000	H	46.73	-56.2	9.7	1.3	-47.8	-13.0	34.8
1420.000	V	45.66	-57.3	9.7	1.3	-48.9	-13.0	35.9
2130.000	H	48.83	-53	11.7	1.2	-42.5	-13.0	29.5
2130.000	V	46.62	-55.5	11.7	1.2	-45.0	-13.0	32.0
2840.000	H	44.36	-55.7	12.3	1.4	-44.8	-13.0	31.8
2840.000	V	43.21	-57.2	12.3	1.4	-46.3	-13.0	33.3
299.660	H	45.32	-63.3	0.0	0.5	-63.8	-13.0	50.8
299.660	V	44.31	-65.7	0.0	0.5	-66.2	-13.0	53.2

Note:
1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

FCC §22.917(a) & §24.238(a) & §27.53 - BAND EDGES
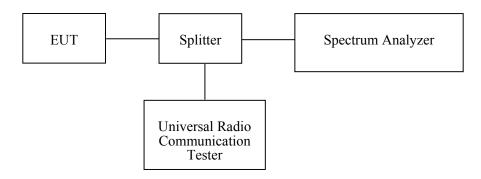
Applicable Standard

FCC § 2.1053, §22.917, § 24.238 and § 27.53.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.

```
┌─────────┐        ┌──────────┐        ┌────────────────────┐
│   EUT   │────────│ Splitter │────────│  Spectrum Analyzer │
└─────────┘        └────┬─────┘        └────────────────────┘
                        │
                 ┌──────────────┐
                 │ Universal Radio│
                 │ Communication │
                 │    Tester     │
                 └──────────────┘
```

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each Time	/
Pasternack	RF Coaxial Cable	0.5m	C-5	Each Time	/
E-Microwave	Two-way Spliter	ODP-1-6-2S	OE0120142	Each Time	/
R&S	Spectrum Analyzer	FSU 26	200256	2017-01-04	2018-01-04
R&S	Spectrum Analyzer	FSU 26	200256	2018-01-04	2019-01-04

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	22.4~24.1°C
Relative Humidity:	30~42 %
ATM Pressure:	100.9~101.5 kPa

The testing was performed by Harry Yang from 2018-01-02 to 2018-02-08.

Test Mode: Transmitting
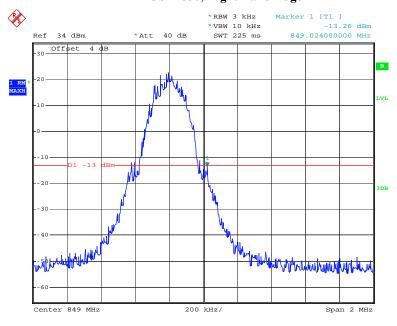
Test Result: Compliant. Please refer to the following plots.

GSM 850, Left Band Edge

```
                                    *RBW 3 kHz      Marker 1 [T1 ]
                                    *VBW 10 kHz              -14.43 dBm
        Ref  34 dBm      *Att  40 dB   SWT 225 ms      824.000000000 MHz
        Offset  4 dB
    30                                                              B
    20
    10                                                              LVL
     0
   -10
D1 -13 dBm                                                          3DB
   -20
   -30
   -40
   -50
   -60
   Center 824 MHz        200 kHz/              Span 2 MHz
```

Date: 2.JAN.2018 21:44:25

GSM 850, Right Band Edge

```
                                    *RBW 3 kHz      Marker 1 [T1 ]
                                    *VBW 10 kHz              -13.26 dBm
        Ref  34 dBm      *Att  40 dB   SWT 225 ms      849.024000000 MHz
        Offset  4 dB
    30                                                              B
    20
    10                                                              LVL
     0
   -10
D1 -13 dBm                                                          3DB
   -20
   -30
   -40
   -50
   -60
   Center 849 MHz        200 kHz/              Span 2 MHz
```
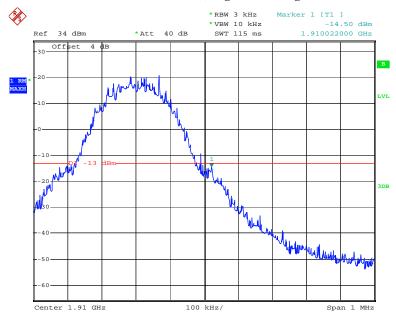
Date: 2.JAN.2018 21:45:02

GSM 1900, Left Band Edge


```
                                    *RBW 3 kHz    Marker 1 [T1 ]
                                    *VBW 10 kHz            -14.03 dBm
        Ref  30 dBm      *Att  40 dB   SWT 115 ms    1.850000000 GHz
   30 Offset  4 dB                                                   A
  -20
1 RM*                                                              LVL
MAXH -10
   0
  -10 ─D1 -13 dBm─
  -20
  -30                                                             3DB
  -40
  -50
  -60
  -70
   Center 1.85 GHz          100 kHz/          Span 1 MHz
```
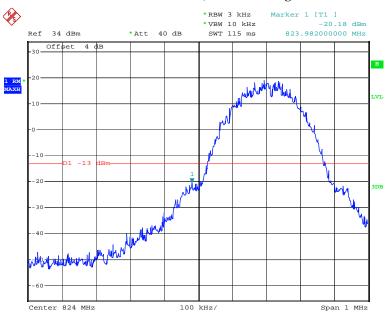
Date: 8.FEB.2018 17:12:14

GSM 1900, Right Band Edge


```
                                    *RBW 3 kHz    Marker 1 [T1 ]
                                    *VBW 10 kHz            -14.50 dBm
        Ref  34 dBm      *Att  40 dB   SWT 115 ms    1.910022000 GHz
      30  Offset  4 dB                                               B
  -20
1 RM*                                                              LVL
MAXH -10
   0
  -10 ─D1 -13 dBm─
  -20
  -30                                                             3DB
  -40
  -50
  -60
   Center 1.91 GHz          100 kHz/          Span 1 MHz
```
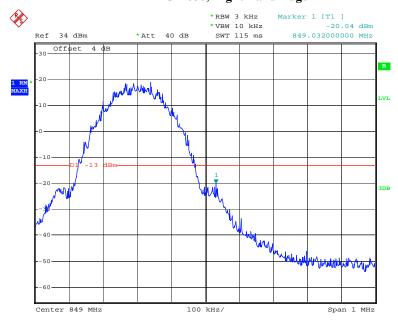
Date: 2.JAN.2018 22:04:31

EDGE 850, Left Band Edge
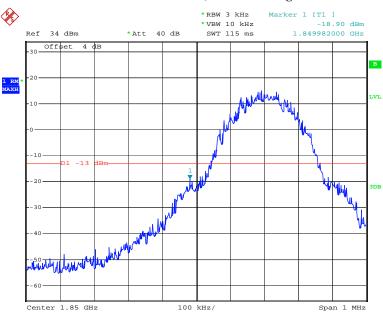
Date: 2.JAN.2018 21:41:51

EDGE 850, Right Band Edge
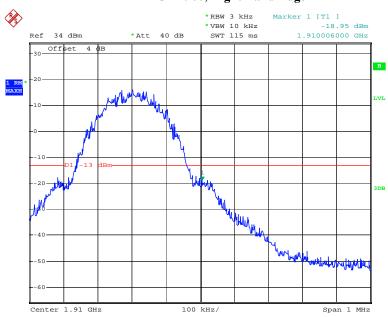
Date: 2.JAN.2018 21:41:09

EDGE 1900, Left Band Edge
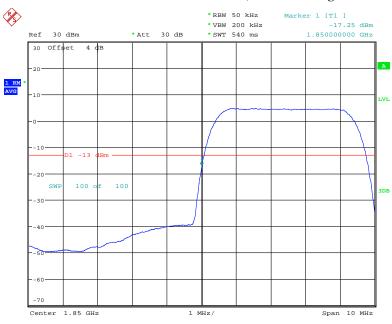
Date: 2.JAN.2018 21:55:56

EDGE 1900, Right Band Edge
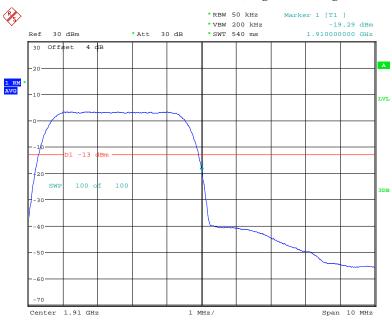
Date: 2.JAN.2018 21:55:18

WCDMA Band II Rel 99, Left Band Edge
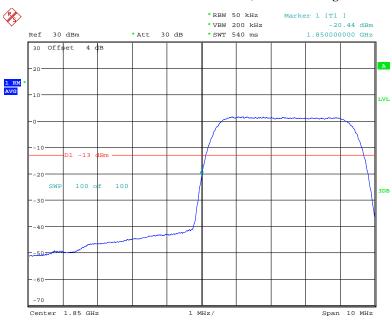
Date: 6.FEB.2018 18:46:25

WCDMA Band II Rel 99, Right Band Edge
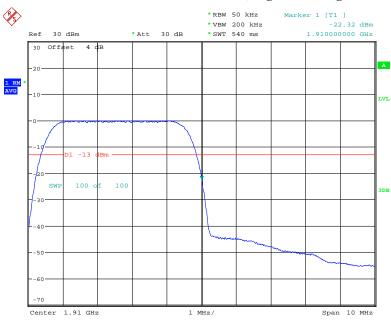
Date: 6.FEB.2018 18:48:06

WCDMA Band II HSUPA, Left Band Edge

```
                                    *RBW  50 kHz      Marker 1 [T1 ]
                                    *VBW 200 kHz                -20.44 dBm
              Ref  30 dBm           *Att  30 dB  *SWT 540 ms    1.850000000 GHz
```
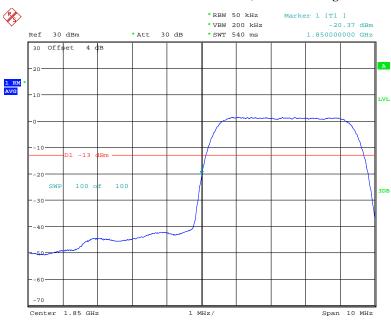
Date: 6.FEB.2018 19:27:49

WCDMA Band II HSUPA, Right Band Edge

```
                                    *RBW  50 kHz      Marker 1 [T1 ]
                                    *VBW 200 kHz                -22.32 dBm
              Ref  30 dBm           *Att  30 dB  *SWT 540 ms    1.910000000 GHz
```
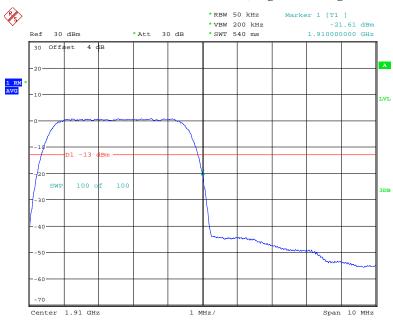
Date: 6.FEB.2018 19:34:05

WCDMA Band II HSDPA, Left Band Edge
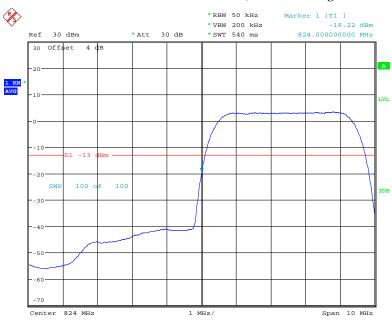
Date: 6.FEB.2018 18:58:30

WCDMA Band II HSDPA, Right Band Edge
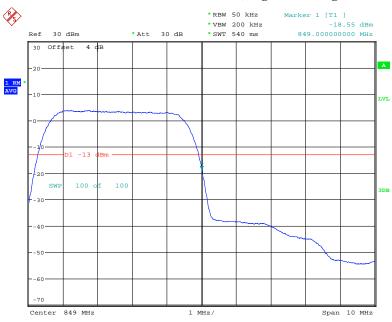
Date: 6.FEB.2018 18:54:59

WCDMA Band V Rel 99, Left Band Edge

```
                                    * RBW  50 kHz      Marker 1 [T1 ]
                                    * VBW 200 kHz              -19.22 dBm
        Ref  30 dBm      * Att  30 dB   * SWT 540 ms      824.000000000 MHz
```
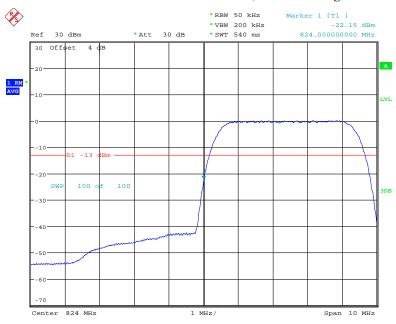
Date: 6.FEB.2018 19:46:31

WCDMA Band V Rel 99, Right Band Edge

```
                                    * RBW  50 kHz      Marker 1 [T1 ]
                                    * VBW 200 kHz              -18.55 dBm
        Ref  30 dBm      * Att  30 dB   * SWT 540 ms      849.000000000 MHz
```
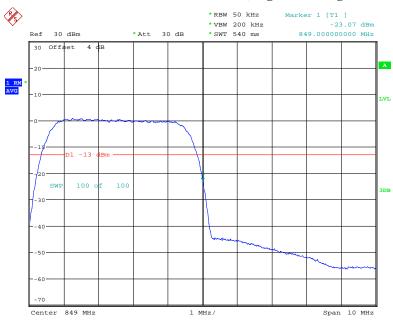
Date: 6.FEB.2018 19:47:51

WCDMA Band V HSUPA, Left Band Edge

		*RBW 50 kHz	Marker 1 [T1]
		*VBW 200 kHz	−22.15 dBm
Ref 30 dBm	*Att 30 dB	*SWT 540 ms	824.000000000 MHz

```
30 Offset 4 dB
```
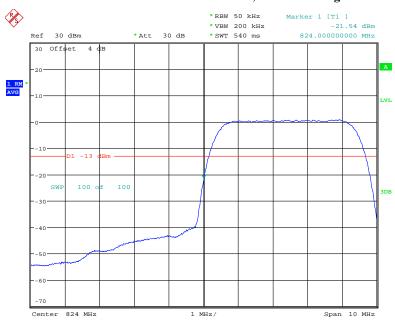
Date: 6.FEB.2018 19:36:50

WCDMA Band V HSUPA, Right Band Edge

		*RBW 50 kHz	Marker 1 [T1]
		*VBW 200 kHz	−23.07 dBm
Ref 30 dBm	*Att 30 dB	*SWT 540 ms	849.000000000 MHz

```
30 Offset 4 dB
```
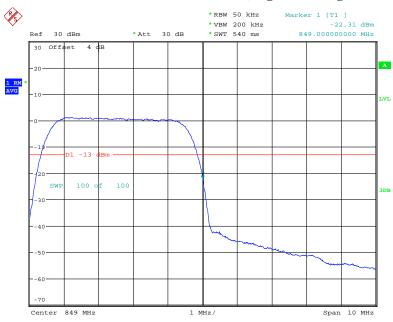
Date: 6.FEB.2018 19:41:24

WCDMA Band V HSDPA, Left Band Edge

Date: 6.FEB.2018 19:44:53
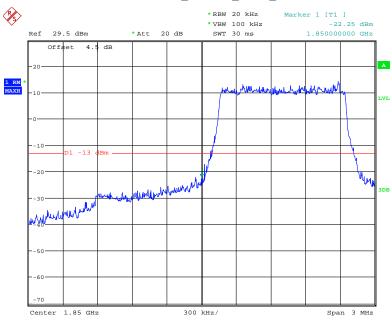
WCDMA Band V HSDPA, Right Band Edge

Date: 6.FEB.2018 19:43:23

LTE Band II

QPSK_1.4MHz_ 6 RB_ Left
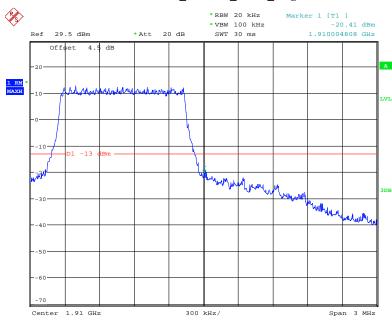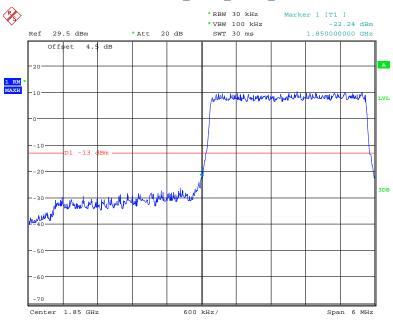
Date: 26.JAN.2018 21:52:00

QPSK_1.4MHz_ 6 RB_ Right
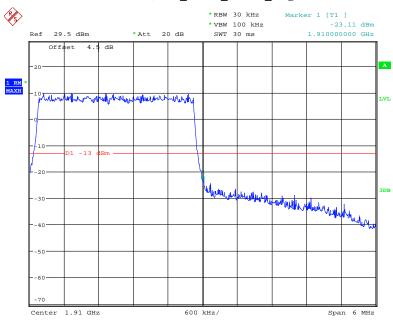
Date: 26.JAN.2018 21:50:09

QPSK_3MHz_ 15 RB_ Left

*RBW 30 kHz	Marker 1 [T1]
*VBW 100 kHz	-22.24 dBm
Ref 29.5 dBm *Att 20 dB SWT 30 ms	1.850000000 GHz

Offset 4.5 dB

D1 -13 dBm

Center 1.85 GHz   600 kHz/   Span 6 MHz
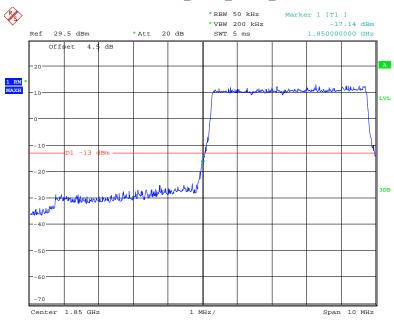
Date: 26.JAN.2018 21:47:15

QPSK_3MHz_ 15 RB_ Right

*RBW 30 kHz	Marker 1 [T1]
*VBW 100 kHz	-23.11 dBm
Ref 29.5 dBm *Att 20 dB SWT 30 ms	1.910000000 GHz

Offset 4.5 dB

D1 -13 dBm

Center 1.91 GHz   600 kHz/   Span 6 MHz
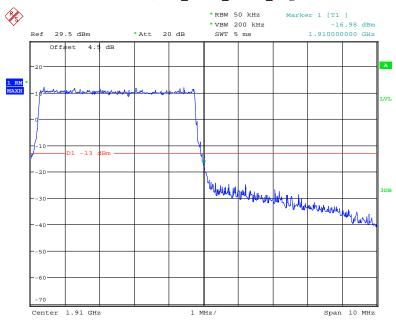
Date: 26.JAN.2018 21:48:57

QPSK_5MHz_ 25 RB_ Left
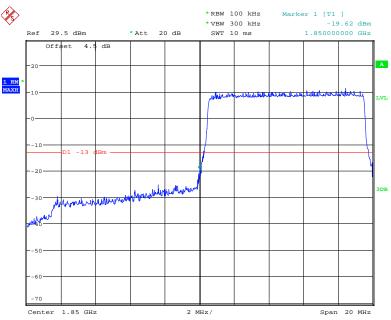
Date: 26.JAN.2018 21:46:21

QPSK_5MHz_ 25 RB_ Right
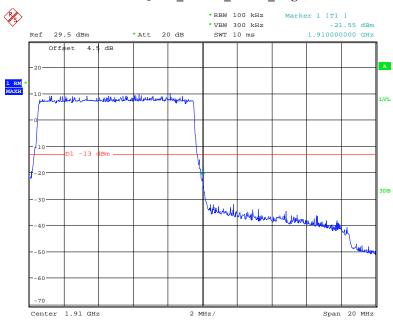
Date: 26.JAN.2018 21:44:10

QPSK_10MHz_ 50 RB_ Left
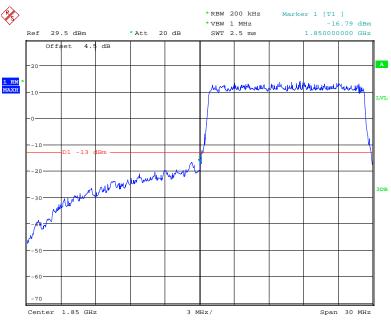
Date: 26.JAN.2018 21:25:01

QPSK_10MHz_ 50 RB_ Right
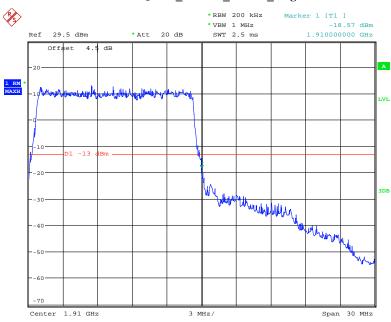
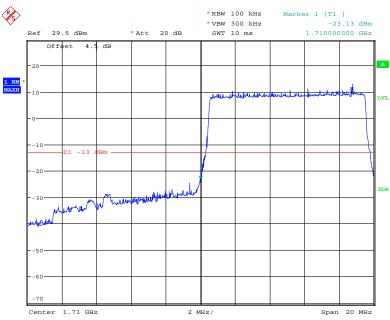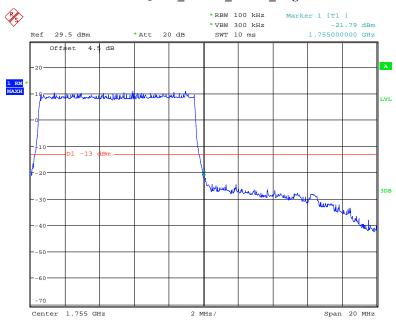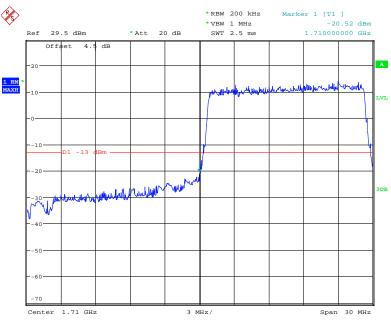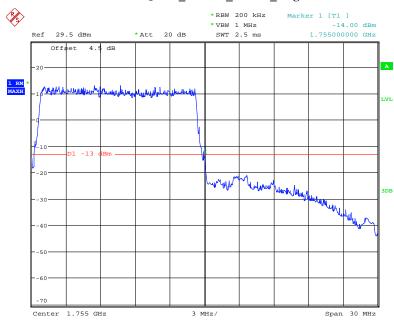Date: 26.JAN.2018 21:23:58

QPSK_15MHz_ 75 RB_ Left
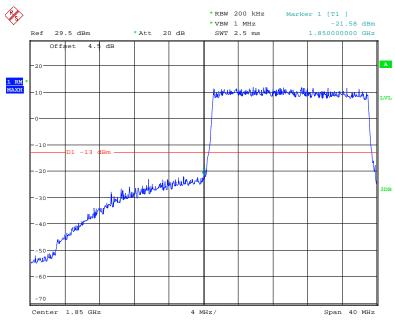
Date: 26.JAN.2018 21:38:10

QPSK_15MHz_ 75 RB_ Right
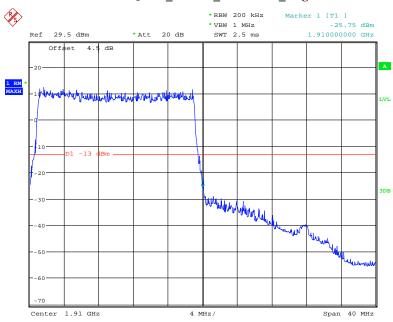
Date: 26.JAN.2018 21:35:34

QPSK_20MHz_ FULL RB_ Left
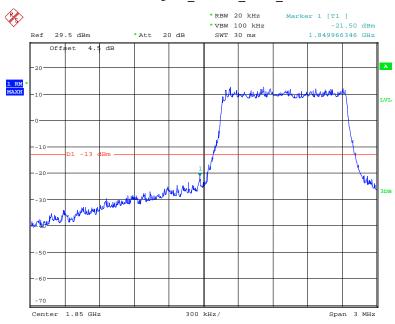
Date: 26.JAN.2018 21:40:49

QPSK_20MHz_ FULL RB_ Right
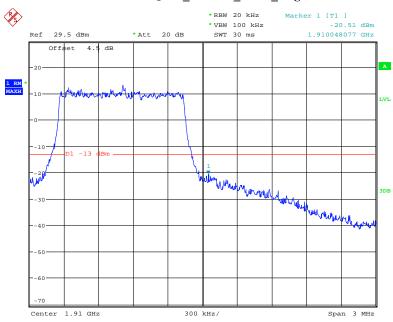
Date: 26.JAN.2018 21:43:03

16QAM_1.4MHz_ 6 RB_ Left

```
                                    * RBW  20 kHz      Marker 1 [T1 ]
                                    * VBW  100 kHz              -21.50 dBm
        Ref   29.5 dBm    * Att  20 dB   SWT 30 ms        1.849966346 GHz
```
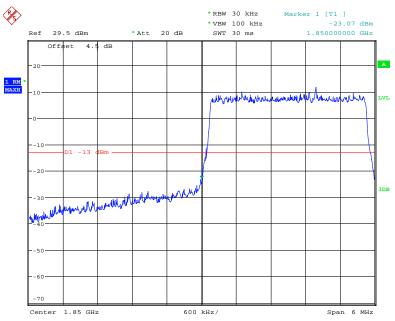
Date: 26.JAN.2018 21:51:38

16QAM_1.4MHz_ 6 RB_ Right

```
                                    * RBW  20 kHz      Marker 1 [T1 ]
                                    * VBW  100 kHz              -20.51 dBm
        Ref   29.5 dBm    * Att  20 dB   SWT 30 ms        1.910048077 GHz
```
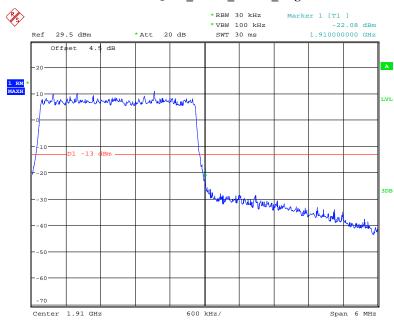
Date: 26.JAN.2018 21:50:45

16QAM_3MHz_ 15 RB_ Left
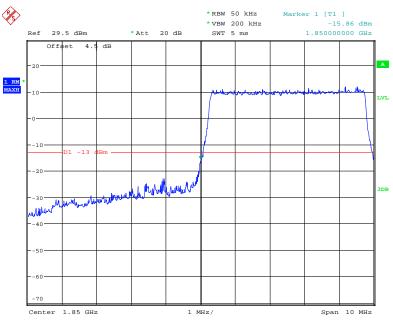
Date: 26.JAN.2018 21:47:52

16QAM_3MHz_ 15 RB_ Right
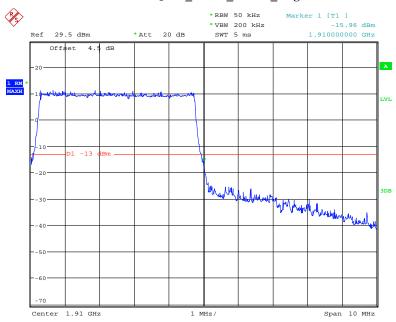
Date: 26.JAN.2018 21:48:34

16QAM_5MHz_ 25 RB_ Left
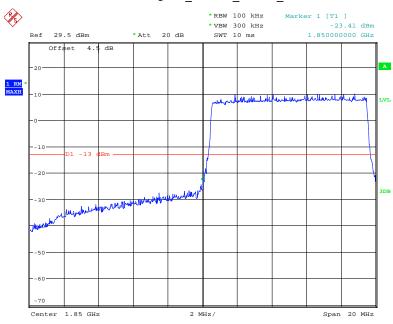
Date: 26.JAN.2018 21:45:46

16QAM_5MHz_ 25 RB_ Right
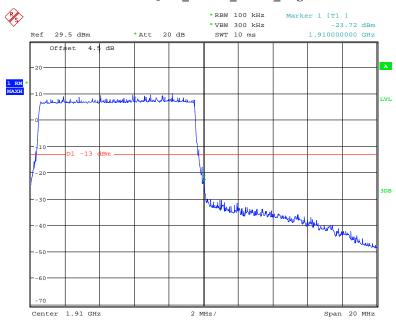
Date: 26.JAN.2018 21:44:59

16QAM_10MHz_ 50 RB_ Left

		*RBW 100 kHz	Marker 1 [T1]	
		*VBW 300 kHz		-23.41 dBm
Ref 29.5 dBm	*Att 20 dB	SWT 10 ms		1.850000000 GHz

Offset 4.5 dB

Center 1.85 GHz   2 MHz/   Span 20 MHz
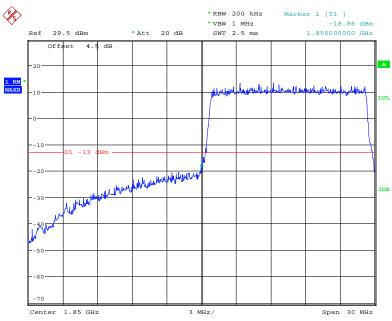
Date: 26.JAN.2018 21:28:17

16QAM_10MHz_ 50 RB_ Right

		*RBW 100 kHz	Marker 1 [T1]	
		*VBW 300 kHz		-23.72 dBm
Ref 29.5 dBm	*Att 20 dB	SWT 10 ms		1.910000000 GHz

Offset 4.5 dB

Center 1.91 GHz   2 MHz/   Span 20 MHz
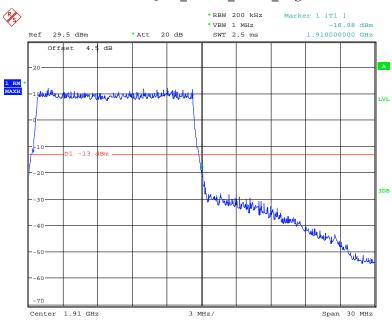
Date: 26.JAN.2018 21:33:41

16QAM_15MHz_ 75 RB_ Left
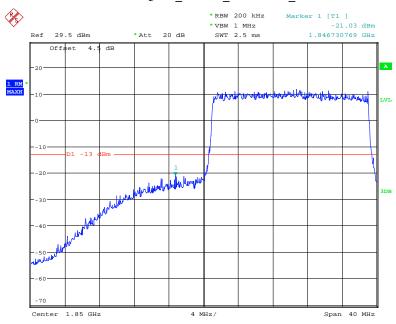
Date: 26.JAN.2018 21:37:11

16QAM_15MHz_ 75 RB_ Right
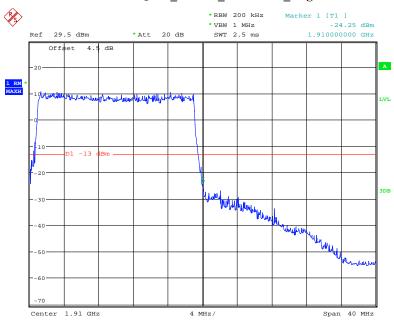
Date: 26.JAN.2018 21:36:18

16QAM_20MHz_ FULL RB_ Left
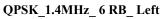
Date: 26.JAN.2018 21:41:39

16QAM_20MHz_ FULL RB_ Right
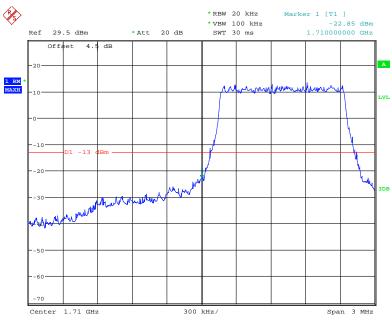
Date: 26.JAN.2018 21:42:32

LTE Band IV

QPSK_1.4MHz_ 6 RB_ Left
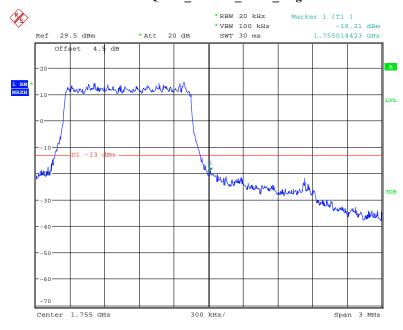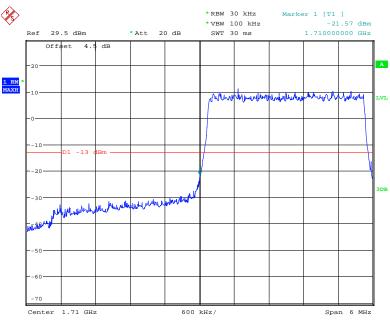
Date: 26.JAN.2018 21:55:10

QPSK_1.4MHz_ 6 RB_ Right
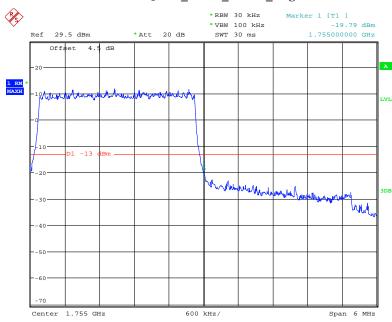
Date: 26.JAN.2018 21:57:13

QPSK_3MHz_ 15 RB_ Left
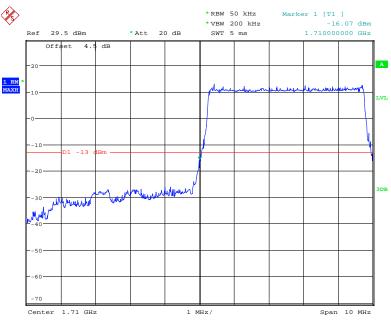
Date: 26.JAN.2018 22:00:48

QPSK_3MHz_ 15 RB_ Right
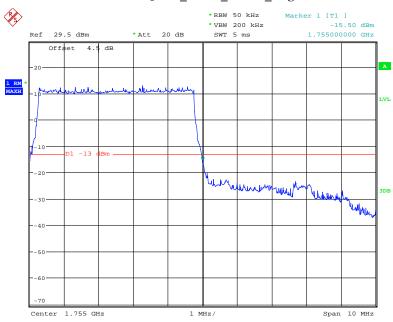
Date: 26.JAN.2018 22:02:55

QPSK_5MHz_ 25 RB_ Left

Date: 26.JAN.2018 22:05:21

QPSK_5MHz_ 25 RB_ Right

Date: 26.JAN.2018 22:03:42

QPSK_10MHz_ 50 RB_ Left

	*RBW 100 kHz	Marker 1 [T1]
	*VBW 300 kHz	-23.13 dBm
Ref 29.5 dBm	*Att 20 dB	SWT 10 ms	1.710000000 GHz

Offset 4.5 dB

Center 1.71 GHz　　　　　2 MHz/　　　　　Span 20 MHz

Date: 26.JAN.2018 22:06:56

QPSK_10MHz_ 50 RB_ Right

	*RBW 100 kHz	Marker 1 [T1]
	*VBW 300 kHz	-21.79 dBm
Ref 29.5 dBm	*Att 20 dB	SWT 10 ms	1.755000000 GHz

Offset 4.5 dB

Center 1.755 GHz　　　　　2 MHz/　　　　　Span 20 MHz

Date: 26.JAN.2018 22:09:04

QPSK_15MHz_ 75 RB_ Left
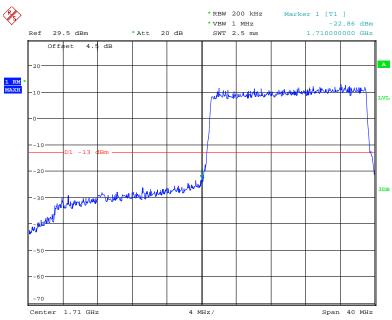
Date: 26.JAN.2018 22:11:48

QPSK_15MHz_ 75 RB_ Right
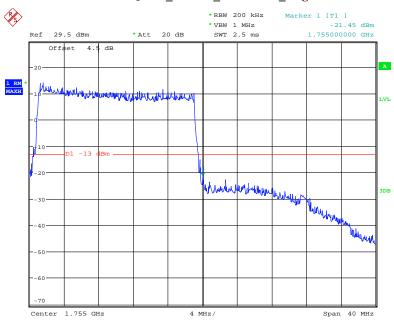
Date: 26.JAN.2018 22:10:06

QPSK_20MHz_ FULL RB_ Left

```
                                      *RBW 200 kHz    Marker 1 [T1 ]
                                      *VBW 1 MHz                -22.86 dBm
        Ref   29.5 dBm     *Att  20 dB   SWT 2.5 ms        1.710000000 GHz
         Offset  4.5 dB
```
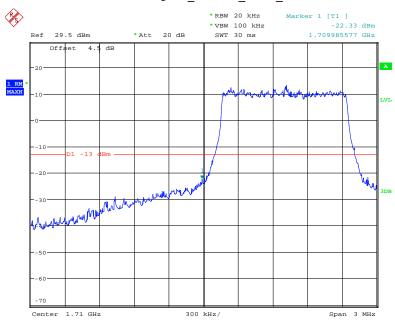
Date: 26.JAN.2018 22:12:33

QPSK_20MHz_ FULL RB_ Right

```
                                      *RBW 200 kHz    Marker 1 [T1 ]
                                      *VBW 1 MHz                -21.45 dBm
        Ref   29.5 dBm     *Att  20 dB   SWT 2.5 ms        1.755000000 GHz
         Offset  4.5 dB
```
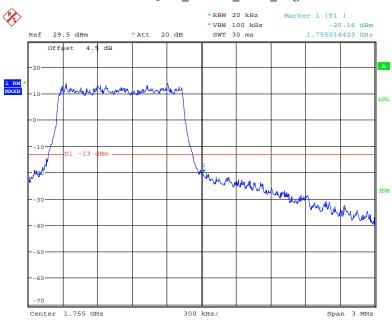
Date: 26.JAN.2018 22:14:26

16QAM_1.4MHz_ 6 RB_ Left

```
                                    *RBW 20 kHz      Marker 1 [T1 ]
                                    *VBW 100 kHz              -22.33 dBm
     Ref  29.5 dBm      *Att  20 dB  SWT 30 ms        1.709985577 GHz
         Offset  4.5 dB                                              A

   20

 1 RM
 MAXH                                                               LVL
   10

    0

  -10
         D1 -13 dBm

  -20

                                                                   3DB
  -30

  -50

  -60

  -70
     Center  1.71 GHz        300 kHz/            Span  3 MHz
```
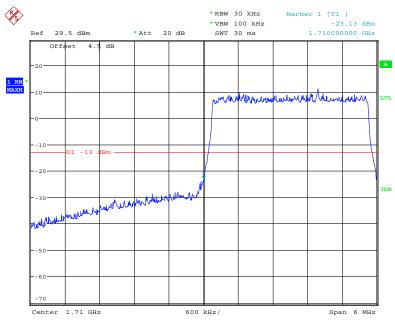
Date: 26.JAN.2018 21:55:49

16QAM_1.4MHz_ 6 RB_ Right

```
                                    *RBW 20 kHz      Marker 1 [T1 ]
                                    *VBW 100 kHz              -20.16 dBm
     Ref  29.5 dBm      *Att  20 dB  SWT 30 ms        1.755014423 GHz
         Offset  4.5 dB                                              A

   20

 1 RM
 MAXH                                                               LVL
   10

    0

  -10
         D1 -13 dBm

                                                                   3DB

  -30

  -40

  -50

  -60

  -70
     Center  1.755 GHz       300 kHz/            Span  3 MHz
```
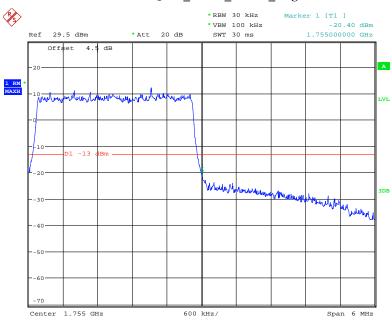
Date: 26.JAN.2018 21:56:39

16QAM_3MHz_ 15 RB_ Left

	*RBW 30 kHz	Marker 1 [T1]
	*VBW 100 kHz	-23.13 dBm
Ref 29.5 dBm *Att 20 dB	SWT 30 ms	1.710000000 GHz

Offset 4.5 dB

A

20

1 RM *
MAXH
10   LVL
0
-10
D1 -13 dBm
-20
3DB
-30

-50

-60

-70

Center 1.71 GHz   600 kHz/   Span 6 MHz
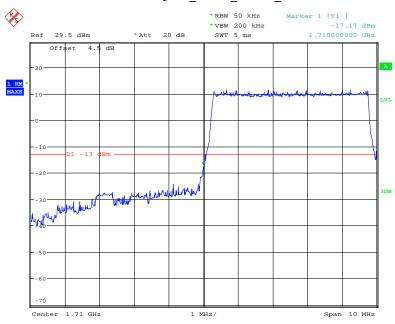
Date: 26.JAN.2018 22:01:20

16QAM_3MHz_ 15 RB_ Right

	*RBW 30 kHz	Marker 1 [T1]
	*VBW 100 kHz	-20.40 dBm
Ref 29.5 dBm *Att 20 dB	SWT 30 ms	1.755000000 GHz

Offset 4.5 dB

A

20

1 RM *
MAXH
10   LVL
0
-10
D1 -13 dBm
-20
3DB
-30
-40
-50
-60
-70

Center 1.755 GHz   600 kHz/   Span 6 MHz
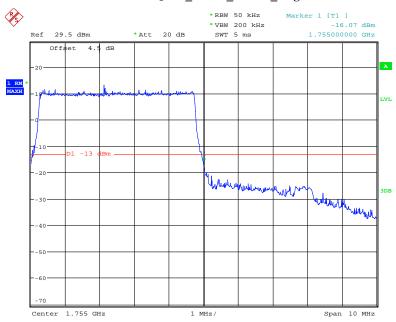
Date: 26.JAN.2018 22:02:16

16QAM_5MHz_ 25 RB_ Left

```
                                        *RBW 50 kHz      Marker 1 [T1 ]
                                        *VBW 200 kHz                -17.17 dBm
         Ref   29.5 dBm      *Att  20 dB   SWT 5 ms         1.710000000 GHz
```
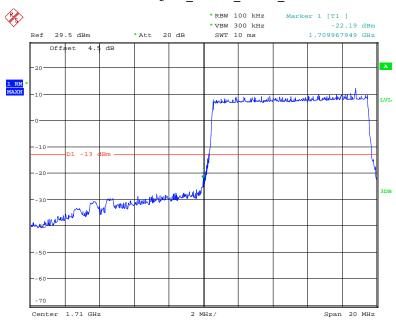
Date: 26.JAN.2018 22:04:46

16QAM_5MHz_ 25 RB_ Right

```
                                        *RBW 50 kHz      Marker 1 [T1 ]
                                        *VBW 200 kHz                -16.07 dBm
         Ref   29.5 dBm      *Att  20 dB   SWT 5 ms         1.755000000 GHz
```
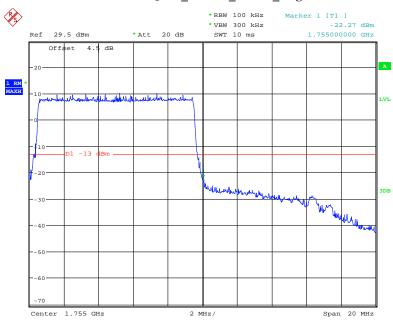
Date: 26.JAN.2018 22:04:08

16QAM_10MHz_ 50 RB_ Left
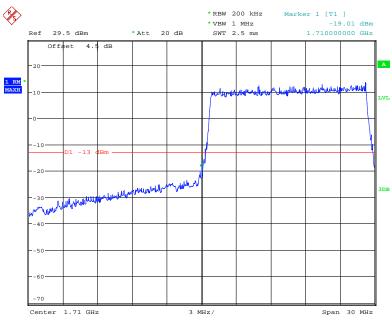
Date: 26.JAN.2018 22:07:37

16QAM_10MHz_ 50 RB_ Right
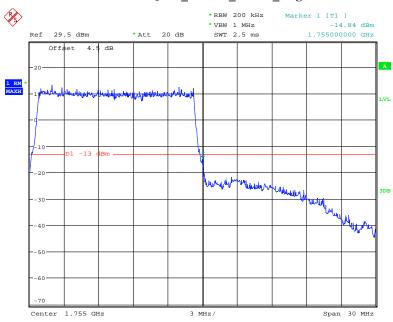
Date: 26.JAN.2018 22:08:13

16QAM_15MHz_ 75 RB_ Left
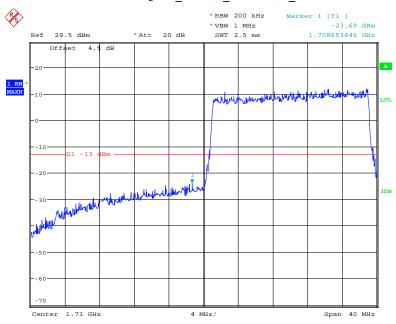
Date: 26.JAN.2018 22:11:17

16QAM_15MHz_ 75 RB_ Right
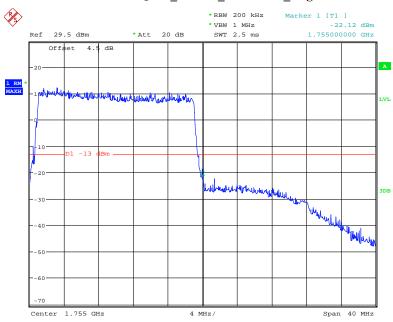
Date: 26.JAN.2018 22:10:36

16QAM_20MHz_ FULL RB_ Left

Date: 26.JAN.2018 22:13:09

16QAM_20MHz_ FULL RB_ Right
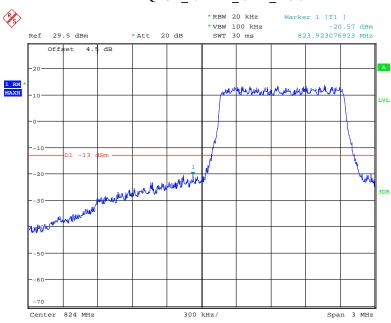
Date: 26.JAN.2018 22:13:57

LTE Band V

QPSK_1.4MHz_ 6 RB_ Left
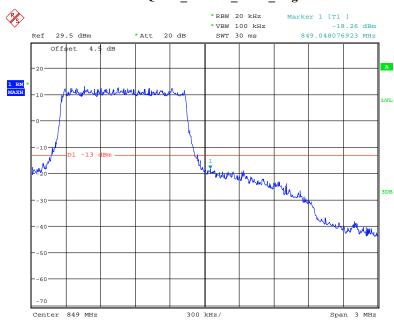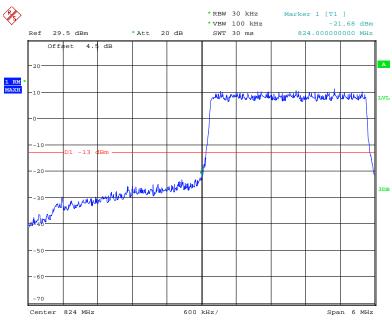
Date: 26.JAN.2018 22:16:34

QPSK_1.4MHz_ 6 RB_ Right
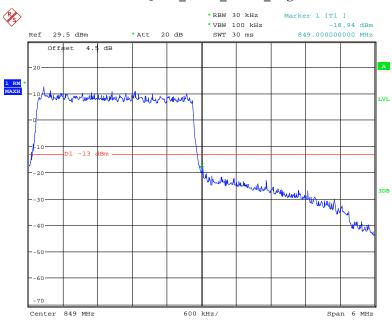
Date: 26.JAN.2018 22:18:19

QPSK_3MHz_ 15 RB_ Left
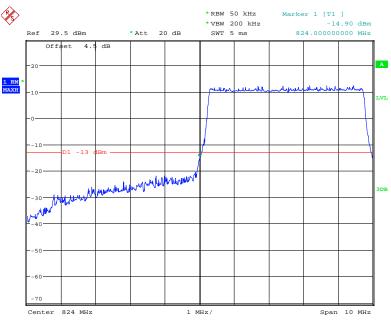
Date: 26.JAN.2018 22:20:54

QPSK_3MHz_ 15 RB_ Right
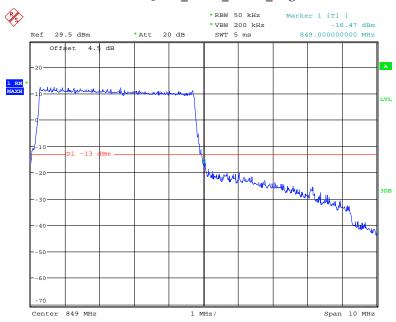
Date: 26.JAN.2018 22:19:16

QPSK_5MHz_ 25 RB_ Left
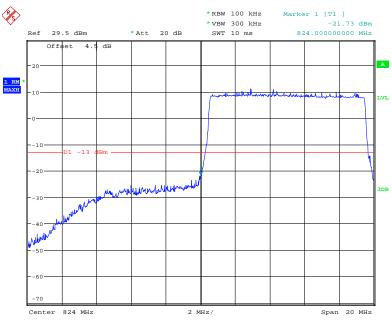
Date: 26.JAN.2018 22:21:46

QPSK_5MHz_ 25 RB_ Right
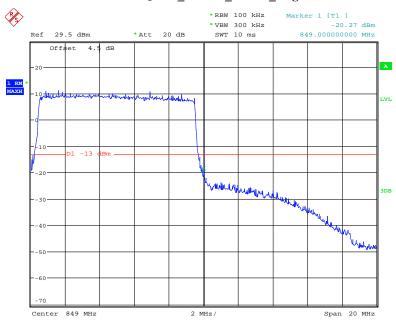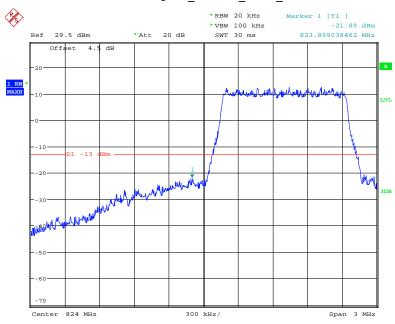

Date: 26.JAN.2018 22:23:16

QPSK_10MHz_ 50 RB_ Left
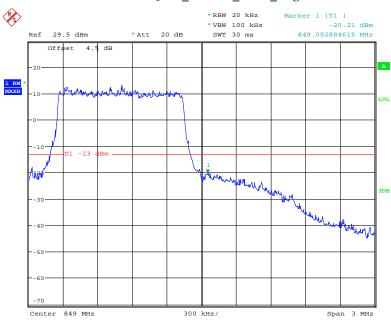

Date: 26.JAN.2018 22:25:43

QPSK_10MHz_ 50 RB_ Right

Date: 26.JAN.2018 22:24:08

16QAM_1.4MHz_ 6 RB_ Left
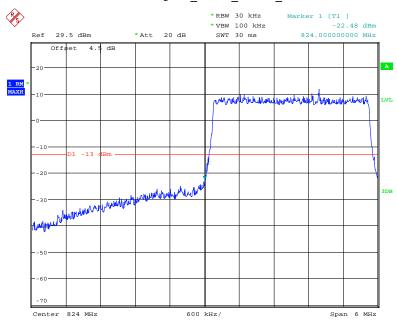

Date: 26.JAN.2018 22:17:07

16QAM_1.4MHz_ 6 RB_ Right
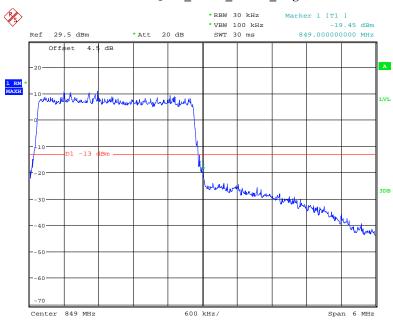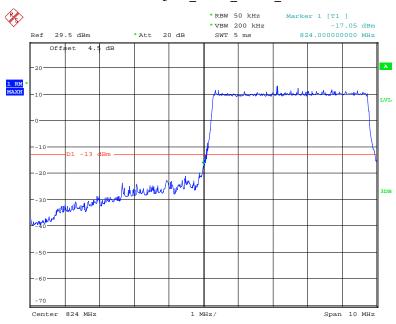

Date: 26.JAN.2018 22:17:53

16QAM_3MHz_ 15 RB_ Left

```
                                        *RBW  30 kHz      Marker 1 [T1 ]
                                        *VBW  100 kHz                -22.48 dBm
        Ref  29.5 dBm      *Att  20 dB   SWT  30 ms       824.000000000 MHz
          Offset  4.5 dB

   20

1 RM
MAXH
   10                                                                    LVL

    0

  -10
       D1 -13 dBm

  -20
                                                                         3DB

  -30

  -50

  -60

  -70
     Center  824 MHz              600 kHz/              Span  6 MHz
```

Date: 26.JAN.2018 22:20:30

16QAM_3MHz_ 15 RB_ Right

```
                                        *RBW  30 kHz      Marker 1 [T1 ]
                                        *VBW  100 kHz                -19.45 dBm
        Ref  29.5 dBm      *Att  20 dB   SWT  30 ms       849.000000000 MHz
          Offset  4.5 dB

   20

1 RM
MAXH
   10                                                                    LVL

    0

  -10
       D1 -13 dBm

  -20
                                                                         3DB

  -30

  -40

  -50

  -60

  -70
     Center  849 MHz              600 kHz/              Span  6 MHz
```
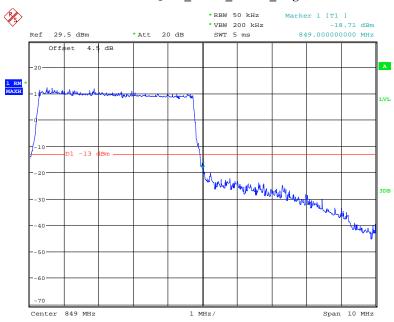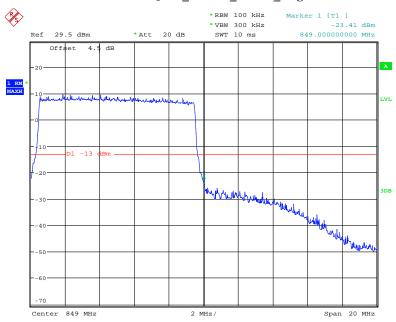
Date: 26.JAN.2018 22:19:52

16QAM_5MHz_ 25 RB_ Left
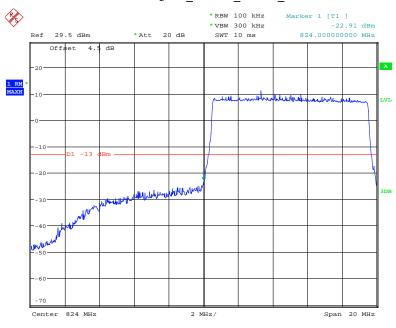
Date: 26.JAN.2018 22:22:15

16QAM_5MHz_ 25 RB_ Right

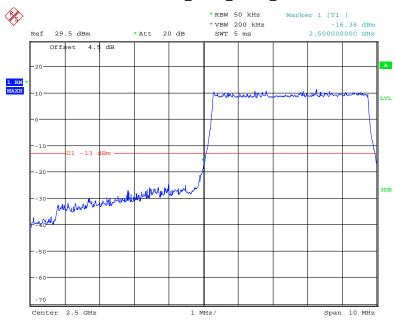Date: 26.JAN.2018 22:22:49

16QAM_10MHz_ 50 RB_ Left

```
                                        *RBW 100 kHz    Marker 1 [T1 ]
                                        *VBW 300 kHz            -22.91 dBm
      Ref   29.5 dBm        *Att  20 dB  SWT 10 ms       824.000000000 MHz
         Offset  4.5 dB                                                    A
  20

1 RM *
MAXH  10                                                                  LVL

   0

 -10
        D1 -13 dBm
 -20                                                                     3DB

 -30

 -40

 -50

 -60

 -70
      Center  824 MHz              2 MHz/             Span  20 MHz
```

Date: 26.JAN.2018 22:25:22

16QAM_10MHz_ 50 RB_ Right

```
                                        *RBW 100 kHz    Marker 1 [T1 ]
                                        *VBW 300 kHz            -23.41 dBm
      Ref   29.5 dBm        *Att  20 dB  SWT 10 ms       849.000000000 MHz
         Offset  4.5 dB                                                    A
  20

1 RM *
MAXH  10                                                                  LVL

   0

 -10
        D1 -13 dBm
 -20                                                                     3DB

 -30

 -40

 -50

 -60

 -70
      Center  849 MHz              2 MHz/             Span  20 MHz
```
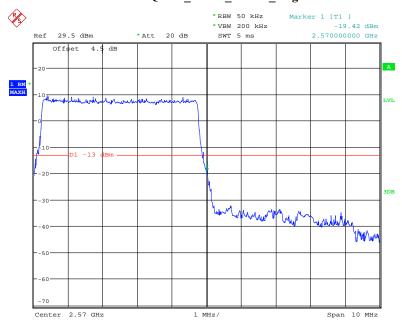
Date: 26.JAN.2018 22:24:40

LTE Band VII

QPSK_5MHz_ 25 RB_ Left
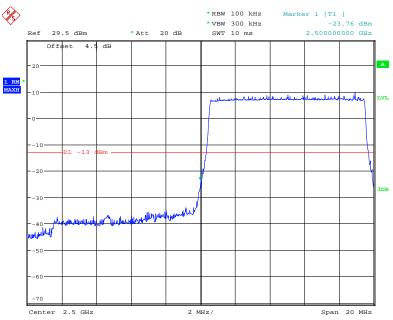
Date: 26.JAN.2018 22:30:24

QPSK_5MHz_ 25 RB_ Right

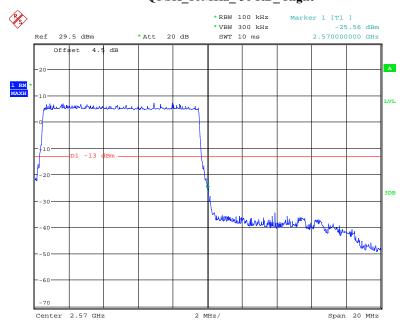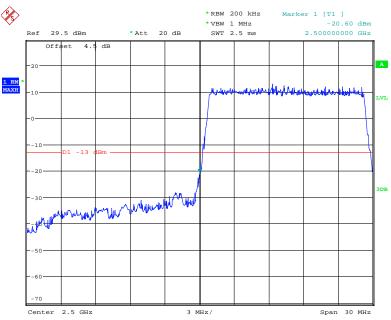Date: 26.JAN.2018 23:21:49

QPSK_10MHz_ 50 RB_ Left

```
                                        *RBW 100 kHz    Marker 1 [T1 ]
                                        *VBW 300 kHz              -23.76 dBm
       Ref  29.5 dBm         *Att  20 dB  SWT 10 ms      2.500000000 GHz
          Offset  4.5 dB
   20
1 RM
MAXH
   10                                                              LVL
    0
  -10
        D1 -13 dBm
  -20                                                              3DB
  -30
  -40
  -50
  -60
  -70
     Center  2.5 GHz           2 MHz/              Span  20 MHz
```

Date: 26.JAN.2018 23:26:15

QPSK_10MHz_ 50 RB_ Right

```
                                        *RBW 100 kHz    Marker 1 [T1 ]
                                        *VBW 300 kHz              -25.56 dBm
       Ref  29.5 dBm         *Att  20 dB  SWT 10 ms      2.570000000 GHz
          Offset  4.5 dB
   20
1 RM
MAXH
   10                                                              LVL
    0
  -10
        D1 -13 dBm
  -20                                                              3DB
  -30
  -40
  -50
  -60
  -70
     Center  2.57 GHz          2 MHz/              Span  20 MHz
```
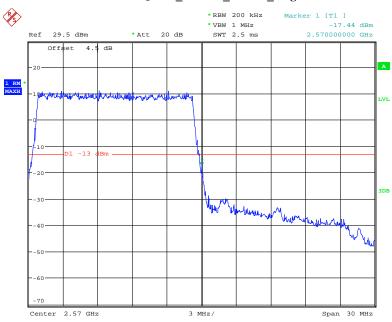
Date: 26.JAN.2018 23:23:36

QPSK_15MHz_ 75 RB_ Left

		*RBW 200 kHz	Marker 1 [T1]
		*VBW 1 MHz	-20.60 dBm
Ref 29.5 dBm	*Att 20 dB	SWT 2.5 ms	2.500000000 GHz

Offset 4.5 dB
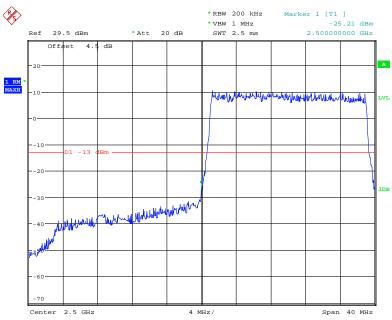
Date: 26.JAN.2018 23:27:13

QPSK_15MHz_ 75 RB_ Right

		*RBW 200 kHz	Marker 1 [T1]
		*VBW 1 MHz	-17.44 dBm
Ref 29.5 dBm	*Att 20 dB	SWT 2.5 ms	2.570000000 GHz

Offset 4.5 dB
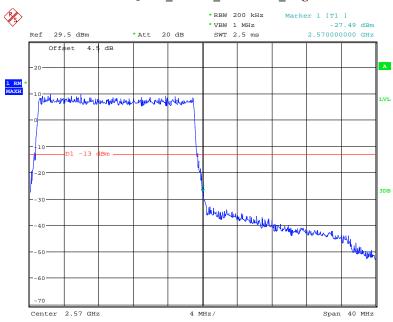
Date: 26.JAN.2018 23:29:43

QPSK_20MHz_ FULL RB_ Left
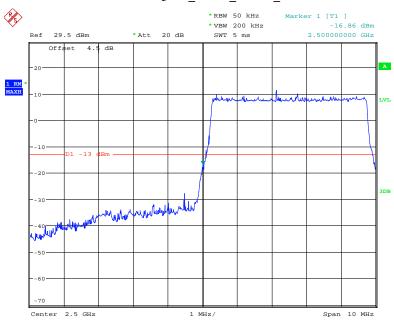
Date: 26.JAN.2018 23:32:39

QPSK_20MHz_ FULL RB_ Right
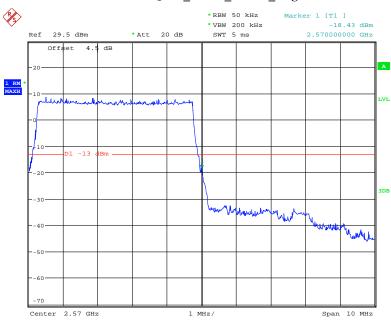
Date: 26.JAN.2018 23:30:33

16QAM_5MHz_ 25 RB_ Left
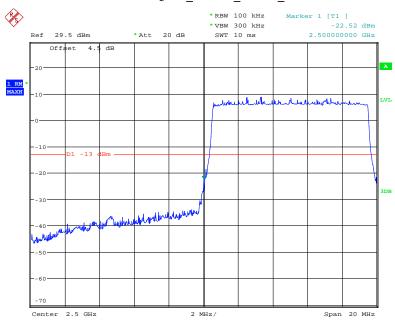
Date: 26.JAN.2018 23:20:21

16QAM_5MHz_ 25 RB_ Right
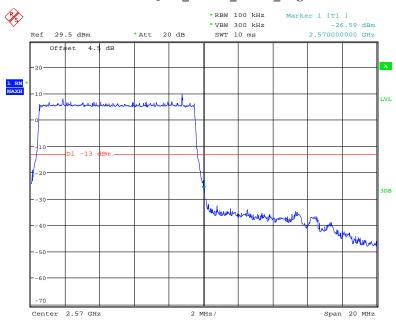

Date: 26.JAN.2018 23:21:19

16QAM_10MHz_ 50 RB_ Left
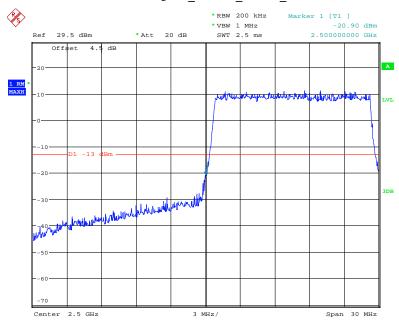
```
                                    *RBW  100 kHz      Marker 1 [T1 ]
                                    *VBW  300 kHz              -22.52 dBm
        Ref   29.5 dBm     *Att  20 dB    SWT 10 ms       2.500000000 GHz
```

Date: 26.JAN.2018 23:25:44

16QAM_10MHz_ 50 RB_ Right

```
                                    *RBW  100 kHz      Marker 1 [T1 ]
                                    *VBW  300 kHz              -26.59 dBm
        Ref   29.5 dBm     *Att  20 dB    SWT 10 ms       2.570000000 GHz
```
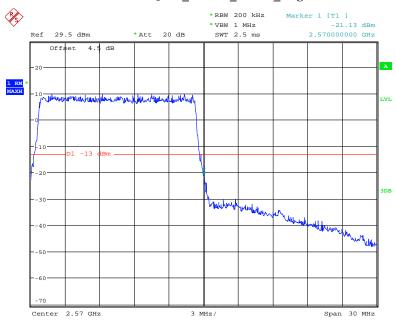
Date: 26.JAN.2018 23:24:46
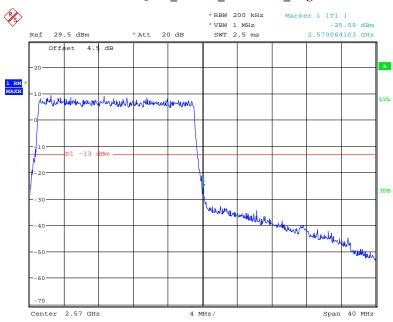
16QAM_15MHz_ 75 RB_ Left
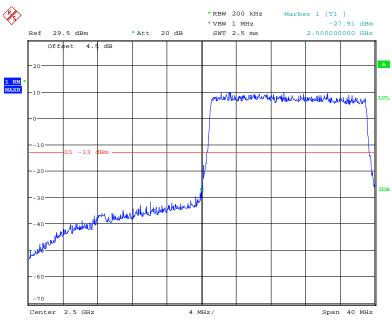
Date: 26.JAN.2018 23:27:53

16QAM_15MHz_ 75 RB_ Right

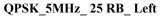Date: 26.JAN.2018 23:28:52

16QAM_20MHz_ FULL RB_ Left

```
                                    *RBW 200 kHz    Marker 1 [T1 ]
                                    *VBW 1 MHz                -27.91 dBm
       Ref  29.5 dBm        *Att  20 dB    SWT 2.5 ms      2.500000000 GHz
```



```
Date: 26.JAN.2018  23:32:17
```

16QAM_20MHz_ FULL RB_ Right

```
                                    *RBW 200 kHz    Marker 1 [T1 ]
                                    *VBW 1 MHz                -25.59 dBm
       Ref  29.5 dBm        *Att  20 dB    SWT 2.5 ms      2.570064103 GHz
```
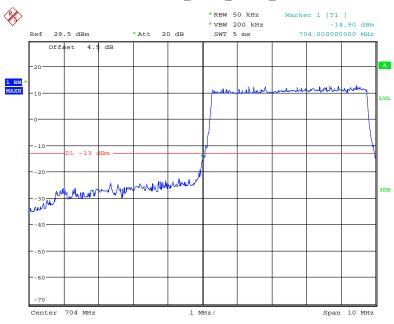


```
Date: 26.JAN.2018  23:31:22
```
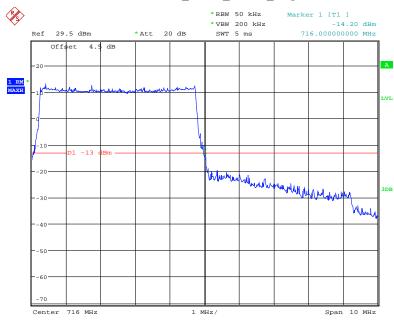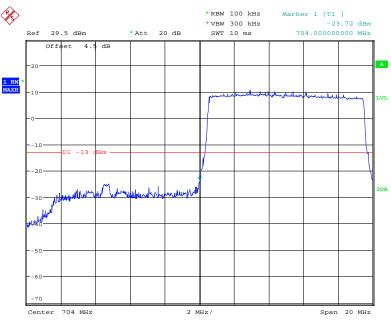
LTE Band XVII

QPSK_5MHz_ 25 RB_ Left

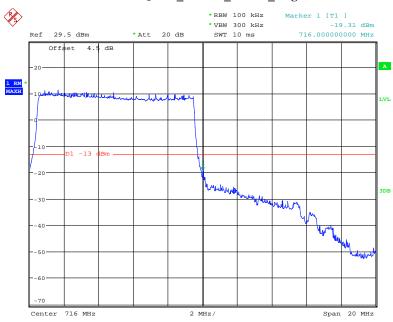Date: 26.JAN.2018 23:35:04

QPSK_5MHz_ 25 RB_ Right

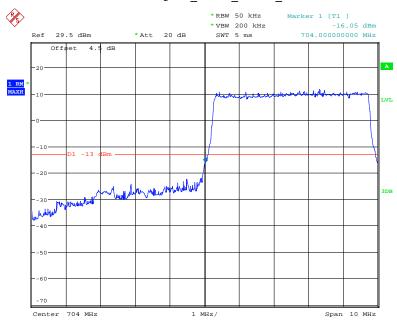Date: 26.JAN.2018 23:36:52

QPSK_10MHz_ 50 RB_ Left

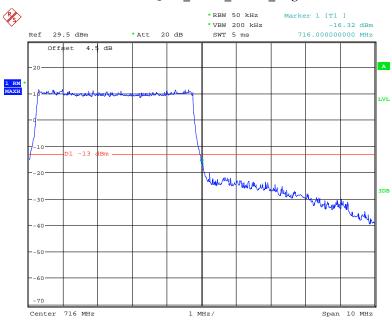Date: 26.JAN.2018 23:39:59

QPSK_10MHz_ 50 RB_ Right

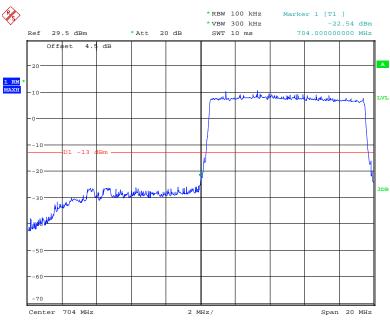Date: 26.JAN.2018 23:37:56

16QAM_5MHz_ 25 RB_ Left

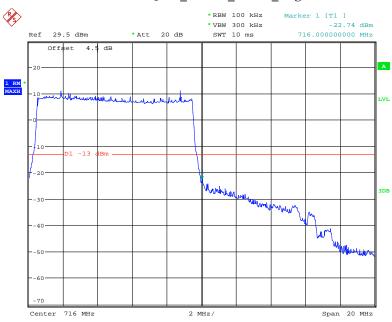Date: 26.JAN.2018 23:35:41

16QAM_5MHz_ 25 RB_ Right

Date: 26.JAN.2018 23:36:20

16QAM_10MHz_ 50 RB_ Left

Date: 26.JAN.2018 23:39:25

16QAM_10MHz_ 50 RB_ Right

Date: 26.JAN.2018 23:38:37

FCC §2.1055, §22.355 & §24.235 & §27.54 - FREQUENCY STABILITY

Applicable Standard

FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235，§27.54

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

Frequency Range (MHz)	Base, fixed (ppm)	Mobile > 3 watts (ppm)	Mobile ≤ 3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929.	5.0	N/A	N/A
929 to 960.	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A
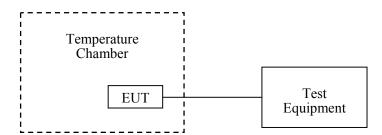
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set from 85% to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Dongzhixu	High Temperature Test Chamber	DP1000	201105083-4	2017-09-10	2018-09-09
R&S	Universal Radio Communication Tester	CMU200	109 038	2017-07-18	2018-07-18
R&S	Wideband Radio Communication Tester	CMW500	147473	2017-08-31	2018-08-31
UNI-T	Multimeter	UT39A	M130199938	2017-04-02	2018-04-02
Unknown	Coaxial Cable	C-SJ00-0010	C0010/02	Each Time	/
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data

Environmental Conditions

Temperature:	24.1 °C
Relative Humidity:	42 %
ATM Pressure:	100.9 kPa

The testing was performed by Harry Yang on 2018-01-02.

Cellular Band (Part 22H)

GMSK, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30		1	0.001	
-20		3	0.004	
-10		4	0.005	
0		3	0.004	
10	3.8	0	0.000	
20		2	0.002	2.5
30		3	0.004	
40		1	0.001	
50		2	0.002	
25	3.6	4	0.005	
25	4.35	3	0.004	

8PSK, Middle Channel, f_c = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	**V_{DC}**	**Hz**	**ppm**	**ppm**
-30		3	0.004	
-20		5	0.006	
-10		4	0.005	
0		4	0.005	
10	3.8	3	0.004	
20		4	0.005	2.5
30		5	0.006	
40		4	0.005	
50		2	0.002	
25	3.6	3	0.004	
25	4.35	4	0.005	

PCS Band (Part 24E)

GMSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Results**
℃	V_{DC}	**Hz**	**ppm**	
-30		-6	-0.003	
-20		-7	-0.004	
-10		-9	-0.005	
0		-7	-0.004	
10	3.8	-8	-0.004	
20		-4	-0.002	Pass
30		-5	-0.003	
40		-6	-0.003	
50		-3	-0.002	
25	3.6	-4	-0.002	
25	4.35	-8	-0.004	

8PSK, Middle Channel, f_c = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Results**
℃	V_{DC}	**Hz**	**ppm**	
-30		-13	-0.007	
-20		-11	-0.006	
-10		-12	-0.006	
0		-13	-0.007	
10	3.8	-15	-0.008	
20		-15	-0.008	Pass
30		-11	-0.006	
40		-14	-0.007	
50		-12	-0.006	
25	3.6	-7	-0.004	
25	4.35	-8	-0.004	

WCDMA Band II: R99

Middle Channel, f$_c$ = 1880.0 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Results**
℃	V$_{DC}$	Hz	ppm	
-30		-9	-0.005	
-20		-4	-0.002	
-10		-3	-0.002	
0		-3	-0.002	
10	3.8	-2	-0.001	
20		0	0.000	Pass
30		-1	-0.001	
40		1	0.001	
50		-1	-0.001	
25	3.6	3	0.002	
25	4.35	2	0.001	

WCDMA Band Ⅴ: R99

Middle Channel, f$_c$ = 836.6 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Limit**
℃	V$_{DC}$	Hz	ppm	ppm
-30		-9	-0.011	
-20		-8	-0.010	
-10		-11	-0.013	
0		-5	-0.006	
10	3.8	-6	-0.007	
20		-6	-0.007	2.5
30		-5	-0.006	
40		-5	-0.006	
50		-4	-0.005	
25	3.6	-4	-0.005	
25	4.35	-3	-0.004	

LTE Band 2:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 1880 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30		-2.13	-0.0011	Pass
-20		-1.56	-0.0008	Pass
-10		-1.87	-0.0010	Pass
0		-0.74	-0.0004	Pass
10	3.8	0.86	0.0005	Pass
20		1.25	0.0007	Pass
30		1.36	0.0007	Pass
40		3.52	0.0019	Pass
50		-1.52	-0.0008	Pass
25	3.6	-1.37	-0.0007	Pass
25	4.35	-0.54	-0.0003	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =1880 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Result
℃	V_{DC}	Hz	ppm	
-30		-0.52	-0.0003	Pass
-20		0.47	0.0003	Pass
-10		0.44	0.0002	Pass
0		0.15	0.0001	Pass
10	3.8	0.23	0.0001	Pass
20		-0.08	0.0000	Pass
30		-0.16	-0.0001	Pass
40		-0.47	-0.0003	Pass
50		0.39	0.0002	Pass
25	3.6	0.11	0.0001	Pass
25	4.35	-0.18	-0.0001	Pass

LTE Band 4:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 1732.5 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	V_{DC}	Hz	ppm	
-30		-4.75	-0.0027	Pass
-20		-5.21	-0.0030	Pass
-10		-6.52	-0.0038	Pass
0		-4.37	-0.0025	Pass
10	3.8	-2.54	-0.0015	Pass
20		-1.37	-0.0008	Pass
30		-4.67	-0.0027	Pass
40		0.15	0.0001	Pass
50		-1.34	-0.0008	Pass
25	3.6	-2.74	-0.0016	Pass
25	4.35	-5.66	-0.0033	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =1732.5 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	V_{DC}	Hz	ppm	
-30		0.54	0.0003	Pass
-20		1.35	0.0008	Pass
-10		2.47	0.0014	Pass
0		3.35	0.0019	Pass
10	3.8	2.68	0.0015	Pass
20		1.36	0.0008	Pass
30		2.41	0.0014	Pass
40		1.16	0.0007	Pass
50		-0.76	-0.0004	Pass
25	3.6	-1.17	-0.0007	Pass
25	4.35	-2.16	-0.0012	Pass

LTE Band 5:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 836.5 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
℃	V_{DC}	Hz	ppm	ppm
-30		0.21	0.0003	
-20		0.54	0.0006	
-10		0.73	0.0009	
0		0.51	0.0006	
10	3.8	1.23	0.0015	
20		1.27	0.0015	2.5
30		1.72	0.0021	
40		1.54	0.0018	
50		1.71	0.0020	
25	3.6	0.59	0.0007	
25	4.35	0.33	0.0004	

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =836.5 MHz				
Temperature	Voltage	Frequency Error	Frequency Error	Limit
℃	V_{DC}	Hz	ppm	ppm
-30		1.15	0.0014	
-20		0.83	0.0010	
-10		1.34	0.0016	
0		0.98	0.0012	
10	3.8	0.54	0.0006	
20		-0.63	-0.0008	2.5
30		-0.42	-0.0005	
40		0.16	0.0002	
50		-0.18	-0.0002	
25	3.6	0.85	0.0010	
25	4.35	0.94	0.0011	

LTE Band 7:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 2535 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	V_{DC}	Hz	ppm	
-30		5.61	0.0022	Pass
-20		7.62	0.0030	Pass
-10		8.14	0.0032	Pass
0		9.33	0.0037	Pass
10	3.8	2.15	0.0008	Pass
20		4.86	0.0019	Pass
30		-0.15	-0.0001	Pass
40		1.34	0.0005	Pass
50		2.59	0.0010	Pass
25	3.6	8.74	0.0034	Pass
25	4.35	11.12	0.0044	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c =2535 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	V_{DC}	Hz	ppm	
-30		2.48	0.0010	Pass
-20		4.48	0.0018	Pass
-10		3.75	0.0015	Pass
0		-2.13	-0.0008	Pass
10	3.8	-2.56	-0.0010	Pass
20		-1.47	-0.0006	Pass
30		4.33	0.0017	Pass
40		-2.45	-0.0010	Pass
50		1.37	0.0005	Pass
25	3.6	2.57	0.0010	Pass
25	4.35	-1.19	-0.0005	Pass

LTE Band 17:

QPSK, Channel Bandwidth:10MHz Middle Channel, f_c = 710 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	V_{DC}	Hz	ppm	
-30		0.21	0.0003	Pass
-20		0.06	0.0001	Pass
-10		-1.37	-0.0019	Pass
0		-1.15	-0.0016	Pass
10	3.8	-1.65	-0.0023	Pass
20		-2.25	-0.0032	Pass
30		-2.17	-0.0031	Pass
40		-0.73	-0.0010	Pass
50		-0.24	-0.0003	Pass
25	3.6	0.31	0.0004	Pass
25	4.35	0.15	0.0002	Pass

16QAM, Channel Bandwidth:10MHz Middle Channel, f_c = 710 MHz				
Temperature	**Voltage**	**Frequency Error**	**Frequency Error**	**Result**
℃	V_{DC}	Hz	ppm	
-30		0.26	0.0004	Pass
-20		0.13	0.0002	Pass
-10		0.07	0.0001	Pass
0		0.15	0.0002	Pass
10	3.8	-0.53	-0.0007	Pass
20		-0.16	-0.0002	Pass
30		-1.27	-0.0018	Pass
40		-0.85	-0.0012	Pass
50		-0.62	-0.0009	Pass
25	3.6	-0.57	-0.0008	Pass
25	4.35	-0.46	-0.0006	Pass

Note: The fundamental emissions stay within the authorized bands of operation based on the frequency deviation measured is small, the extreme voltage was declared by applicant.

***** END OF REPORT *****